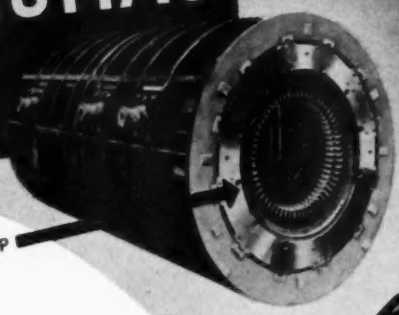
ELECTRICAL TIMES

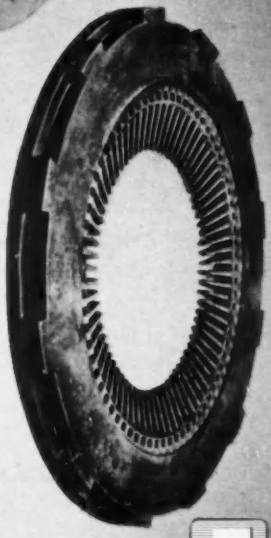
THURSDAY
1 JAN.
1953
NINEPENCE

FERRANTI NOMAG

Non-Magnetic
CAST IRON



FERRANTI NOMAG STATOR END CLAMP



For the B.E.A. Stourport power station, English Electric Company Ltd. engineers specified Ferranti Nomag for the stator end clamps. It has proved to be eminently suitable for this and innumerable other applications in the electrical industry because of its unique combination of qualities. Nomag characteristics are:

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Resistance-temperature coefficient	*Between 0°C and 100°C per °C = ·00045*
Physical toughness	*Izod value 29 ft. lb.*
Maximum magnetic permeability	*1·03*

Good machining properties

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Yes—AND 740 cells in use

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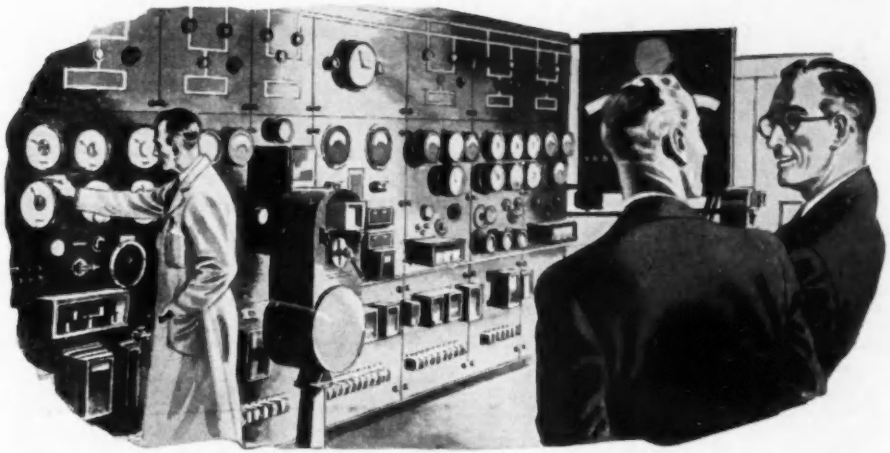

These are the actual details of the performance of Nife batteries operated by a Municipal Authority.

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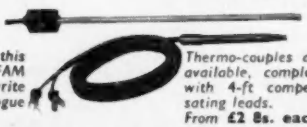

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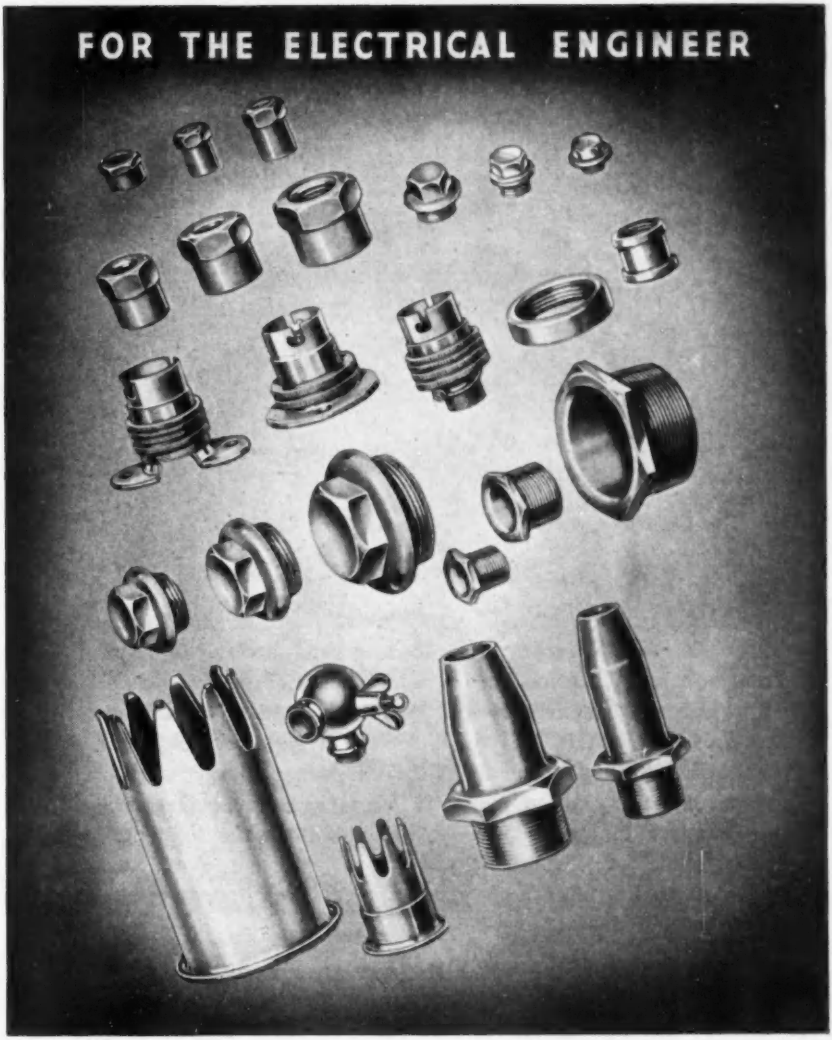

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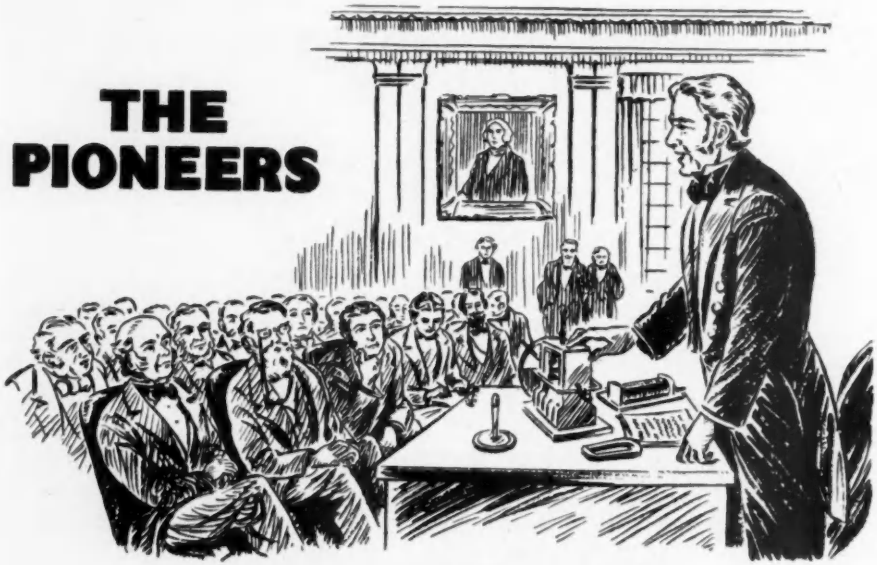

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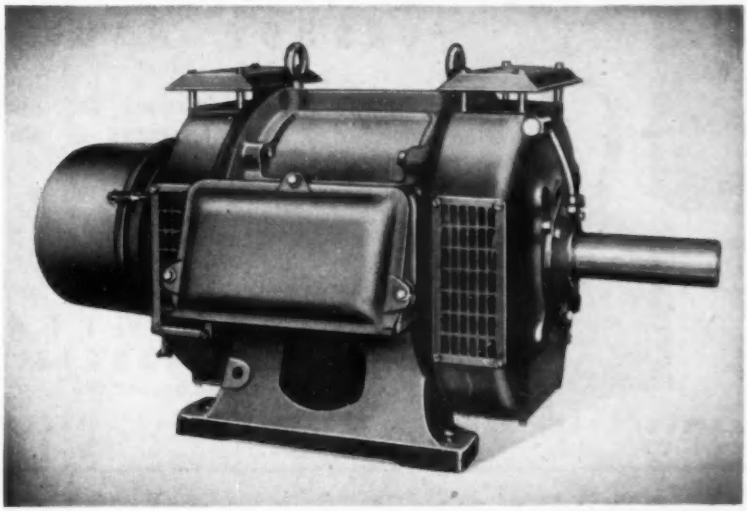

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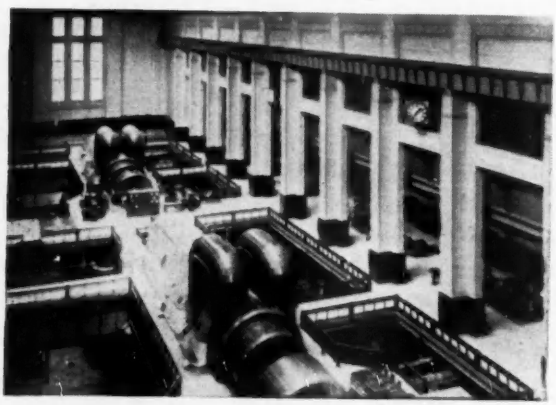

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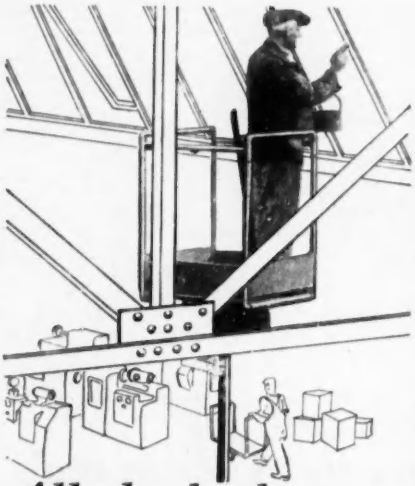

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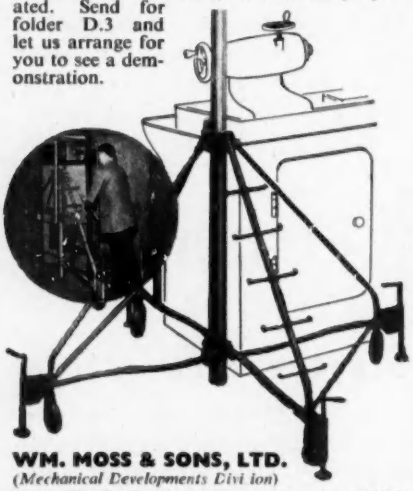

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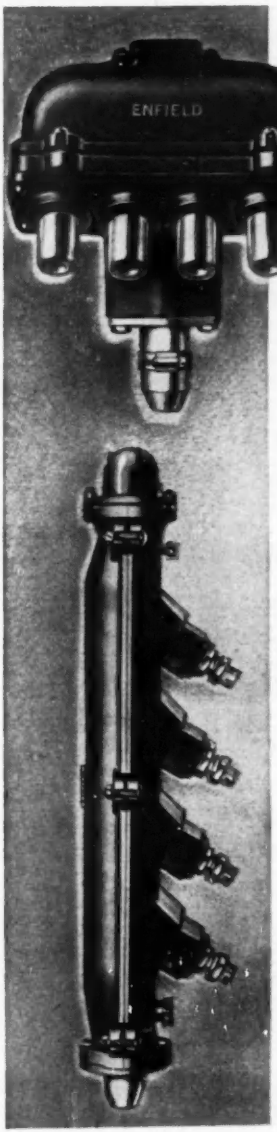

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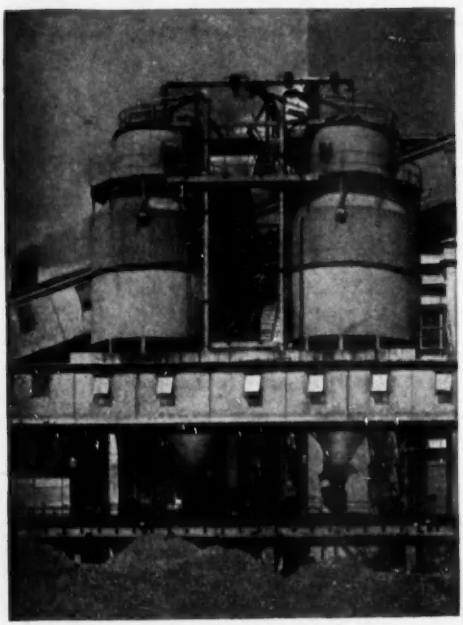

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Left: Type 50-B 'VARIAC'

Right: Type 100-R 'VARIAC'

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Type	Load Rating	Input Voltage	Current		Output Voltage	No-Load Loss	Net Price £ s. d. *
			Rated	Maximum			
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200-CMH } 200-CUH }	580 va.	230 v. / 115 v.	2 a. / 0.5 a.	2.5 a. / 2.5 a.	0-270 v. / 0-270 v.	20 watts / 20 watts	9 15 0 / 8 5 9

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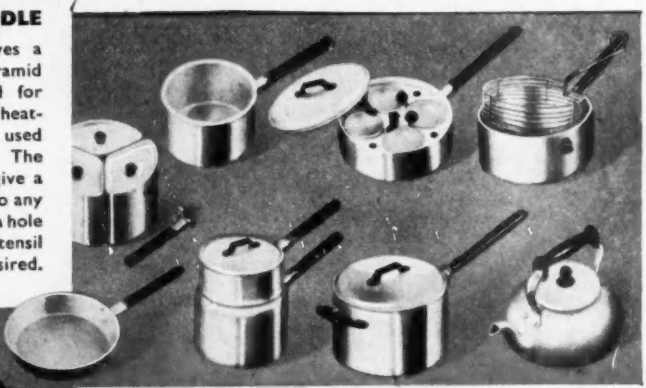

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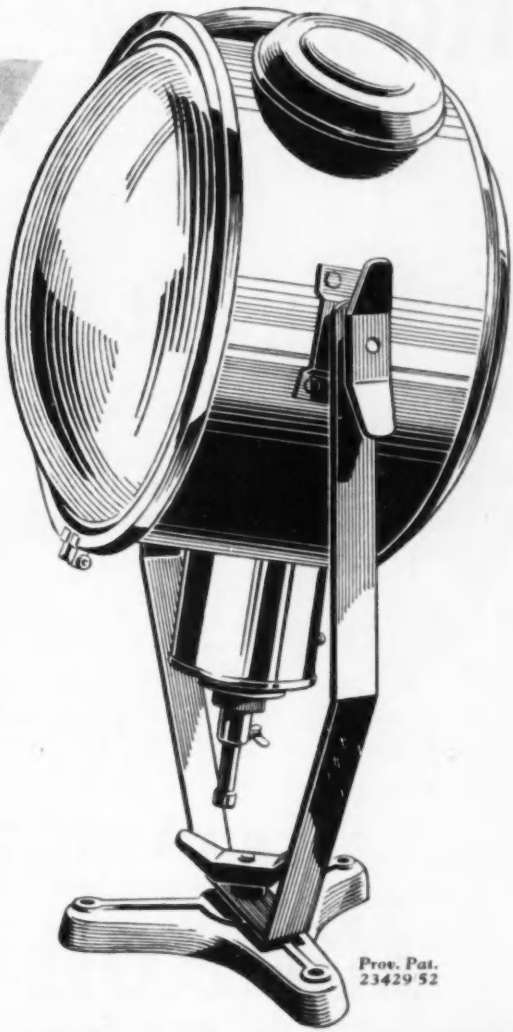

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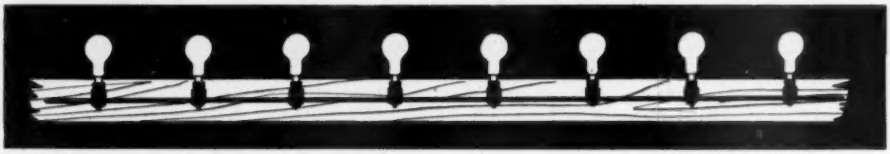

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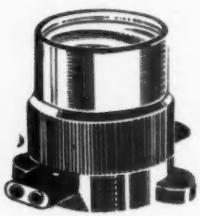

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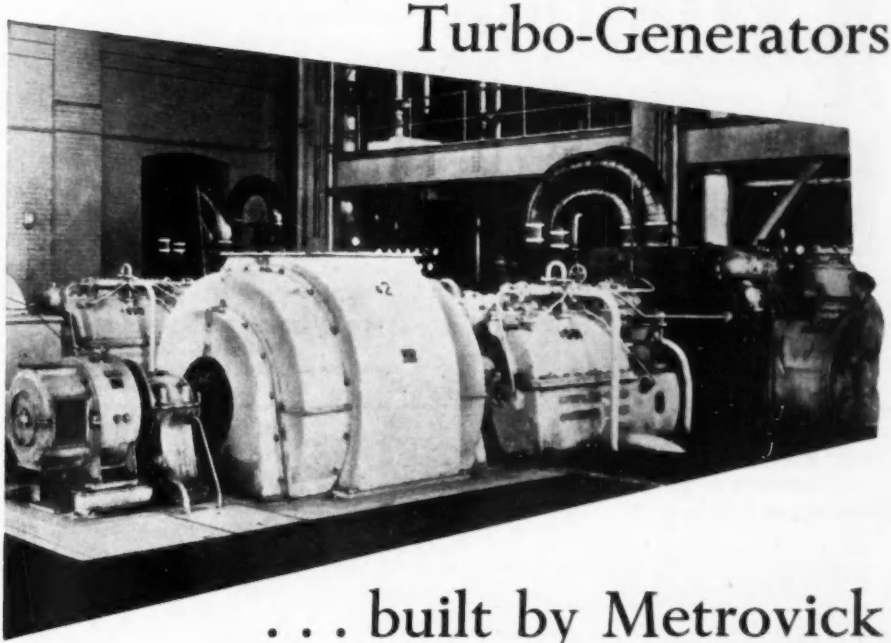

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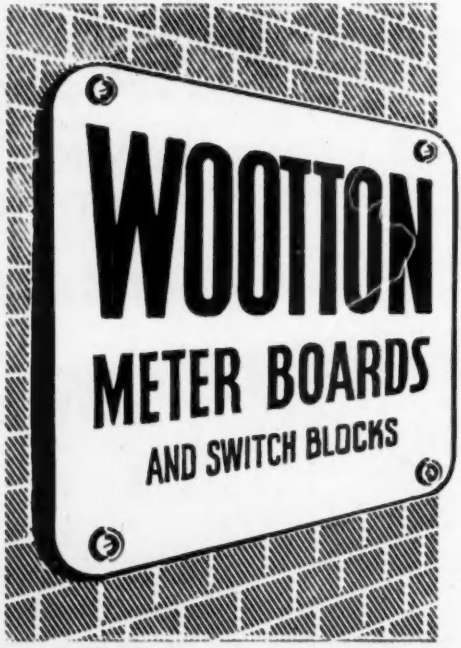

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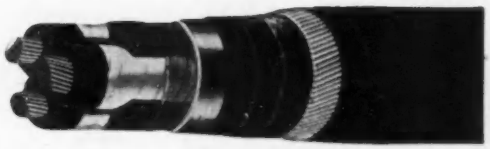

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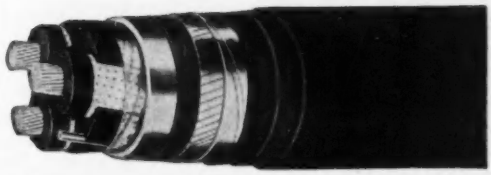

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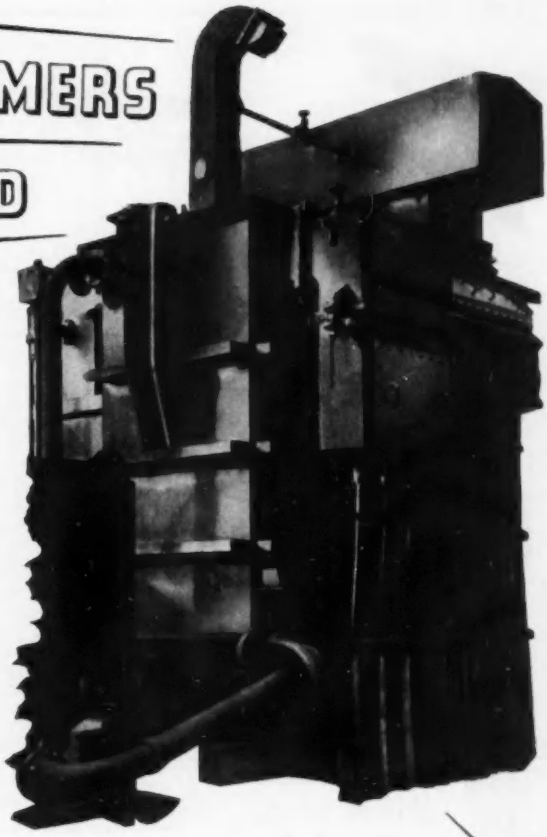

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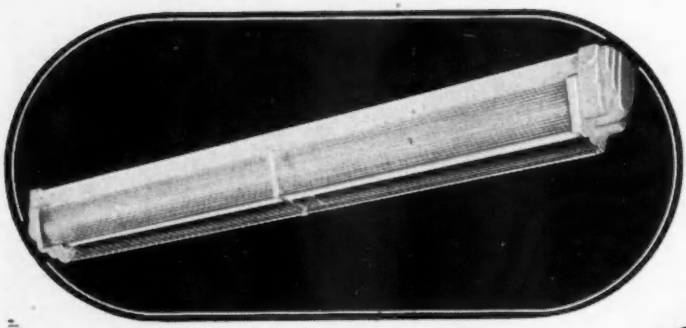

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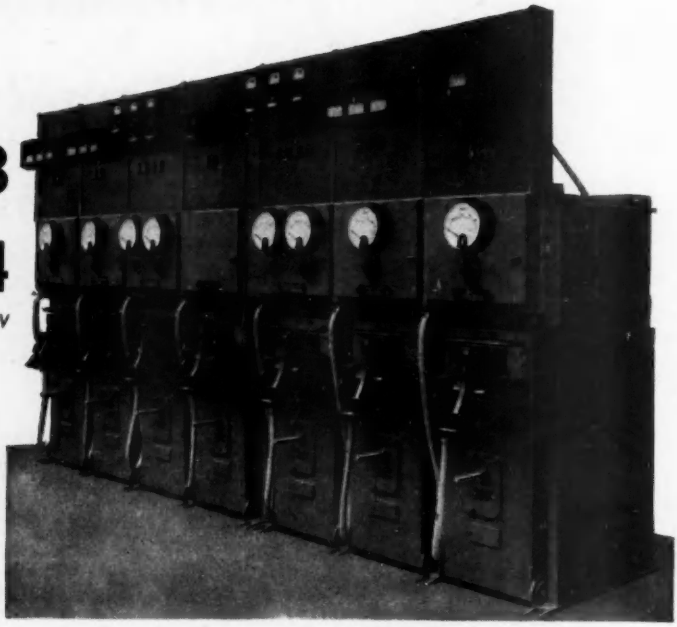

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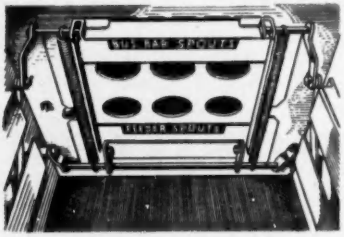

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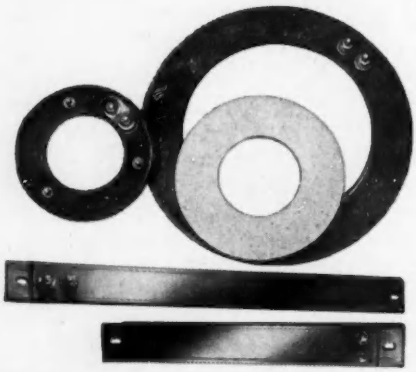

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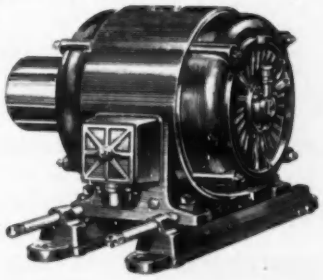

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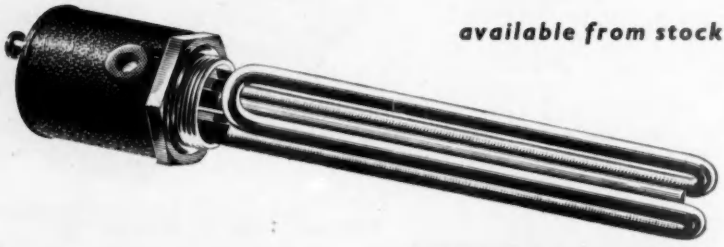

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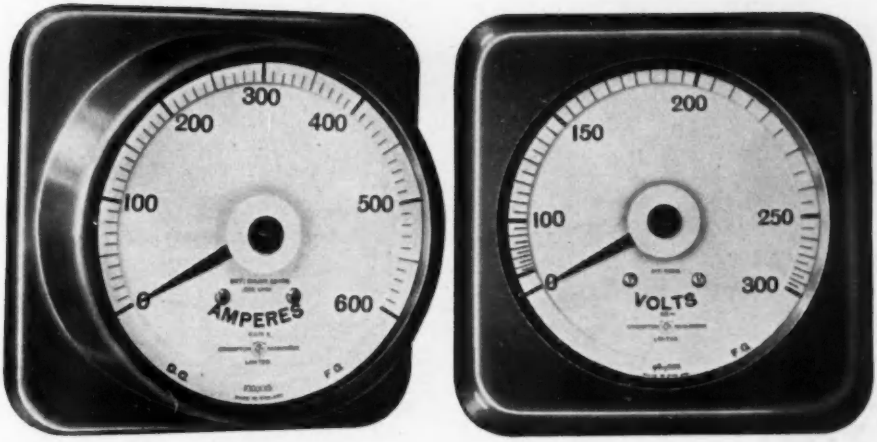

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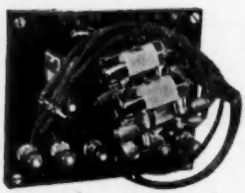

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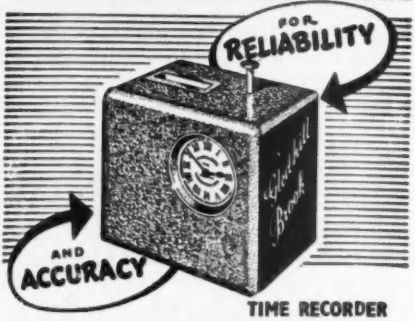

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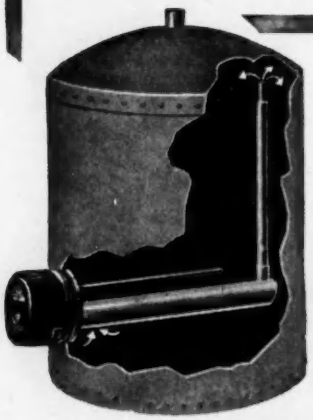

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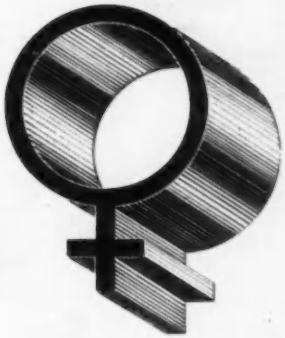

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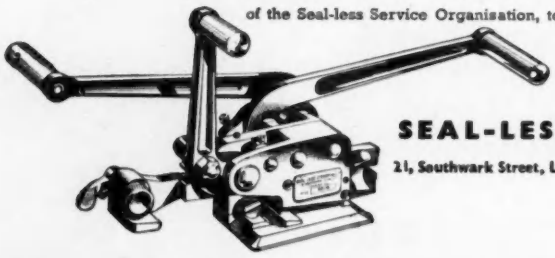

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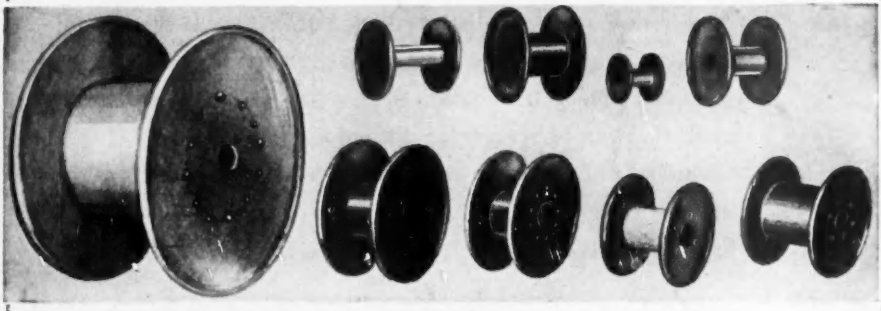

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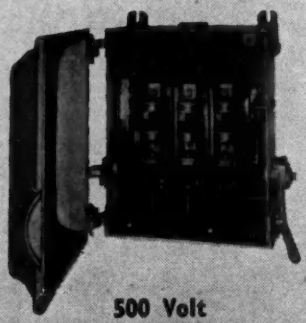

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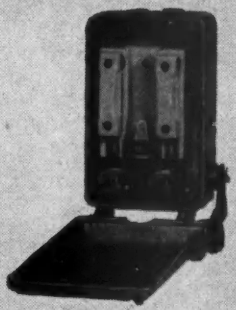

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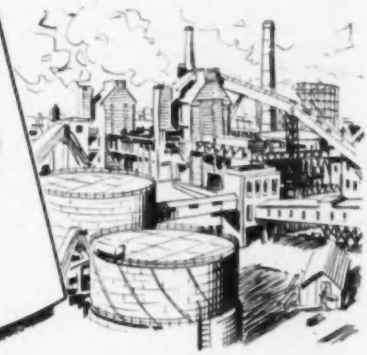

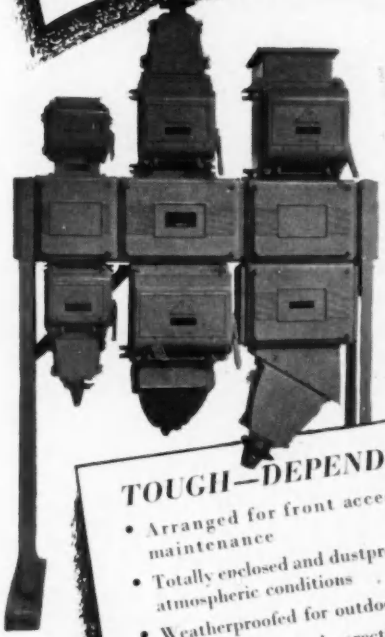

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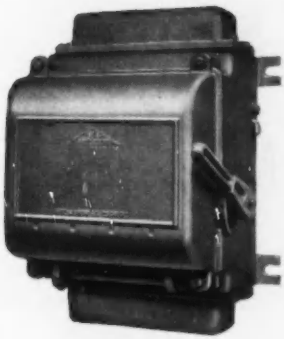

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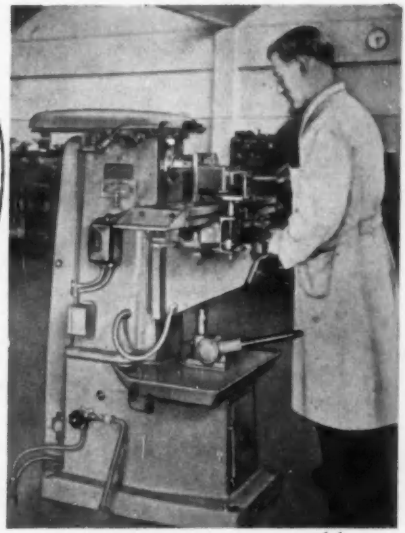

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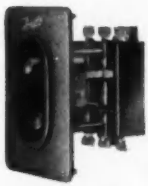

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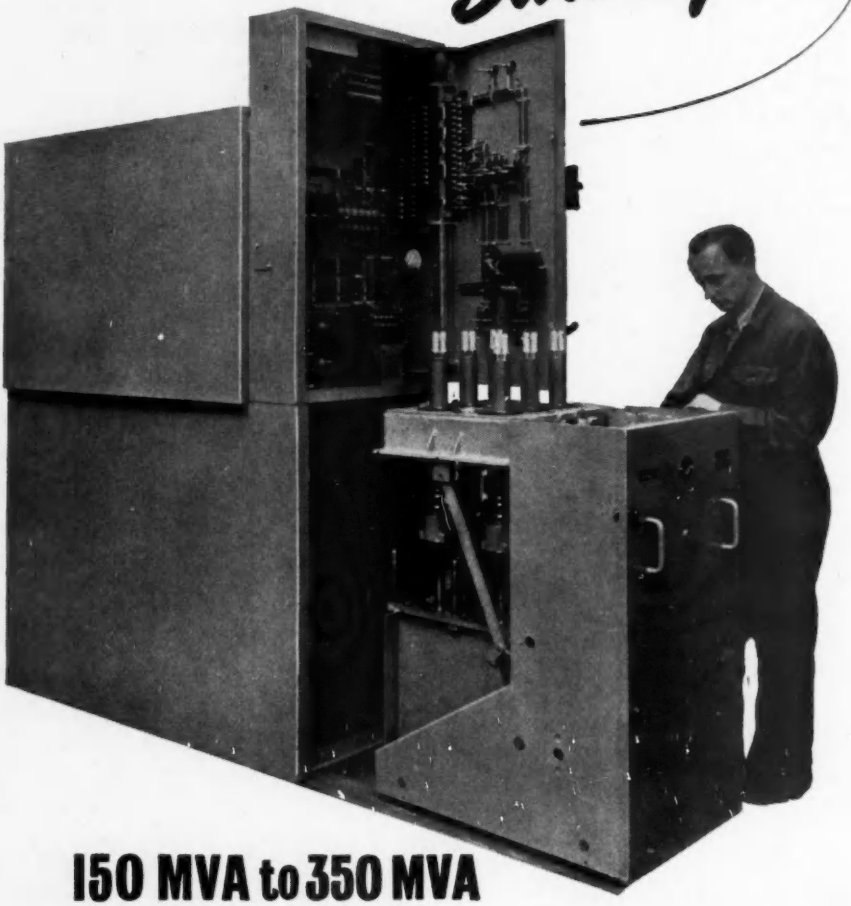

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Editorial

UNSTATED REASONS

ONE of the less acceptable features of the five reports which the Monopolies and Restrictive Practices Commission has issued in the past three years, has been the repeated assumption that all forms of aggregated rebate and special trade association discount are necessarily "against the public interest." To take an example in the electrical field, these types of arrangement were attacked in both the report on wires and cables and in that on lamps. Yet, in spite of this constancy of condemnation, the general philosophy prompting it has not yet been argued publicly by the Commission at any great length. One result has been a difficulty in effectively considering the conclusions which the Commission has presented in its reports: one link in the chain of argument has always seemed to be missing. There is thus sound reason to welcome the recent decision of the President of the Board of Trade, that the Commission should prepare a report on the general effect of association discounts, aggregated rebates, and such techniques of association discipline as the "stop" and "black" list. The conclusions which the Commission reaches after having the many aspects of these specific problems argued before it by trade associations and other interested parties will re-illumine past reports, and will make the value of future statements by the Commission more readily assessable.

IN FAVOUR OF FAIRS

IF any British manufacturer is wondering whether participation in trade fairs is worth while, he would do well to consider the case of Germany. The Federal Republic has in the past year been attracting serious attention as an increasingly successful competitor to Britain in the world's export markets. One of the foundations of that country's recent advance in this field has been the detailed attention given to ensuring widespread and effective representation in large exhibitions, both in Europe and overseas. A recent article in a German export magazine develops this theme, and the story it tells may contain the answer to hesitant industrialists here. The writer of this article takes as an example of the success that may flow from this policy, the German participation in the recent Toronto Fair. "Germany stole the Fair" is reported as American comment, while Canadian decisions to hold a similar exhibition in 1953 are interpreted as an invitation to bid for orders for the St. Lawrence Waterway scheme and other large Canadian projects. Evidently, for a country struggling to return to a prominent place amongst the industrial nations, this activity is well worth while. It should be equally rewarding to Great Britain in her determination to retain her position as a major exporter.

THE LOAD GOES UP

COLD weather for most of November and during the early part of December, provided the B.E.A. with the first severe test of its system capacity for two years. Temperatures some eight degrees lower than those of a year earlier were prevalent, with an immediate effect on lagging load curves that should make the outlook for next March's financial balance less doleful than at one time seemed probable. These temperatures line up closely with those experienced in December 1950: but what a difference in the outcome. Then—panic measures to conserve coal, emergency load-spreading arrangements, and widespread load cuts; today there are few immediate worries about coal, and only sporadic and widely separated instances of interrupted supply. There are a number of reasons for this remarkable change. Foremost amongst them must be mentioned the successful effort made by the B.E.A., with the co-operation of manufacturers, to bring new

plant speedily into operation; and it is significant here to note that even without the December rush of commissioning that usually sends the yearly total of plant soaring, installations in the first eleven months of the year reached four figures in terms of megawatts sent out. Less welcome is the effect of the much publicised recession in demand growth, which has undoubtedly eased matters. Finally comes the coal position, which was healthily robust at the beginning of the cold spell as a result of mild weather last winter and of better production results. The outcome is most encouraging to all who have been fighting the bad name that electricity has acquired from the difficult interim post-war period. Once more the industry can carry the load —or very nearly so!

TIME FOR CLOCKS

WHEN the sales records of electrical retailers are tabulated after the present Christmas selling boom has passed, how will the electric synchronous clock be found to figure? Two years ago, it had fallen low in repute. The effects of low-frequency running and the irregular, though repeated, interruption in supply had combined to make the inaccuracy of electrical timekeepers almost a music-hall joke. Since those days, however, the improvement in the supply position has been steady. Slight deviations from the close accuracy of the earlier days may still occur in the stress of operating an over-strained system, but these are now comparatively small. The return of electric clocks back into the public's confidence should have been similarly progressive; yet the looked-for improvement in sales has not so far been apparent. This is reflected in production figures, which for the earlier part of this year have lagged far behind those prevailing in 1949. The monthly average has been 23,000 against 43,000. This position suggests that the buying public has not really appreciated the way in which the supply position has improved, probably simply because they have not been told this unequivocally. Steps should be taken energetically to correct this situation, and to bring the slim and silent timekeeper back into popular favour as the acceptable gift appropriate to all occasions.

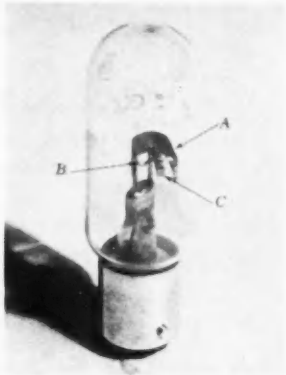
TRANSATLANTIC TURBINES

GAS turbines designed for electricity generation are receiving increasing attention throughout the world. A recent American survey shows no fewer than 17 machines coming into operation on supply systems in that country during the four years 1950-53, more than the six or seven planned for this country in the same period, though the variety of designs is less. Comparison between the two countries shows that the American machines tend to be smaller, with 5 MW both the maximum and the most common rating. Another difference concerns inlet gas temperatures, which run at some two to three hundred degrees higher in the U.S. than is common here. While thermal efficiency is much the same, there is one more important difference in the field of application. Because natural gas and oil are available in the United States at relatively low prices, the gas turbo-alternator is not being confined to peak load and load centre operation. It is proving successful as a base load unit in some small stations, especially on systems which rely mainly on hydro-generation, but have to use thermal plant when there is a shortage of water.

NEW YEAR PROSPECT

THIS brand new 1953 presents an uncertain outlook for the electrical industry with its diverse interests. Only one feature seems universally common to all manufacturers, retailers, contractors and supply engineers: the product will be available for sale, but a hard selling programme, based on a forward-looking plan, will be necessary to persuade the public to buy. Yet there are good grounds for hope in the upsurge of public confidence and spending which the pageantry of a Coronation year can induce, and so as we wish our readers a happy and prosperous New Year, we do so with the conviction that hard work can indeed bring this about.

Meteor



Fluorescent Lamp Starting

BY VOLTAGE TRANSIENTS

A simple method of assessing starter performance is described by

R. D. KNOTT, M.Sc., and I. D. COLSTON, B.Sc.*

THE starting of fluorescent lamps by glow starters, and the ways in which these can modify the inductive voltage surge in the lamp circuit are discussed in the following article. A measuring equipment is also described, in which both the peak value and the energy of the transient are taken into account.

Basic Principles

The starting voltage of an electric discharge lamp intended for operation from ordinary mains supplies is usually appreciably higher than the supply voltage, so that auxiliary devices are frequently used to start the lamp without the use of a step-up transformer.

The cathodes of fluorescent lamps designed for operation from such supplies are coated with a thermionically emissive material, and when they are heated to electron emitting temperatures, the lamp will frequently start without further assistance. This heating alone is, however, insufficient to guarantee lamp starting under adverse conditions, such as high atmospheric humidity, low ambient temperature and low mains supply voltage. One very widely used technique, to provide reliable starting, is to preheat the lamp cathodes and subsequently to apply a suitable voltage transient to start the lamp. Several types of starter have been developed to carry out this cycle of operations automatically, and two types will be briefly described before proceeding further.

The Glow Starter

Fig. 1 (a) is a photograph of a typical glow discharge type of starter. This is, itself, a small discharge tube of the negative glow type, filled with a helium-hydrogen gas mixture, containing 15% of hydrogen, at a pressure of 40 mm. of mercury, and its electrodes form the switch contacts. One electrode, "C," is fixed and consists of a rod of soft iron. The other electrode is made from a U-shaped piece of bimetallic strip, which flexes when heated and carries a molybdenum contact at its free end. The glow starter is either fitted with a small bayonet cap or is mounted, together with a small parallel capacitor, in a metal canister, as shown in Fig. 1 (b). This capacitor is connected externally in the circuit when the now obsolescent capped starter is used.

Fig. 2 gives a typical circuit using a glow starter for running a single fluorescent lamp from an a.c. supply. On closing the switch

* *Research Laboratories of the General Electric Company Ltd., Wembley, England.*

Fig. 1a, at top of page shows details of a glow starter and 1b (right) shows mounting arrangement

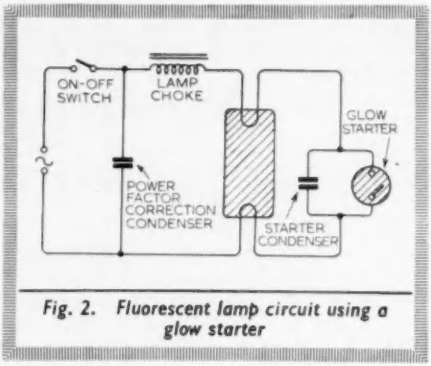


Fig. 2. Fluorescent lamp circuit using a glow starter

"A," a glow discharge takes place between the starter electrodes, heating the bimetallic strip. As a result, the starter contacts close and the low resistance lamp cathodes are heated by passage of almost the full choke limited current. Meanwhile the bimetallic electrode in the starter is cooling down, and, after a few seconds, the starter contacts reopen. This breaking of the inductive circuit produces a voltage surge, which, under favourable circumstances, will start the lamp. The voltage across the starter electrodes will then be the same as the lamp running voltage, and the starter is so designed that this is insufficient to maintain a glow discharge within it. The contacts of the starter will therefore remain open ready for the next occasion on which the lamp is to be started. Should the lamp fail to start at the first opening of the starter contacts, a discharge will pass again and the cycle of operations will be repeated until the lamp starts.

Thermal starters are an alternative form of starting device. They also consist essentially of one fixed and one moving contact, the latter being mounted at the free end of a bimetallic strip. The contacts are touching in the "at rest" position, and a small heater coil is used to flex the bimetallic element when the lamp circuit is completed.

Starter Characteristics

In order to assess the field performance of glow starters, carefully designed and controlled laboratory tests have been made over a period of several years, on small batches of starters selected at random from the factory production. To do this, the starters are operated in normal lamp circuits on a short duration switching cycle, measurements of the glow starting and extinction voltages and the contact closing and closed times being made at fixed intervals during the test. These voltage and time parameters have been fully discussed in a previous article[1], and they will only receive this brief mention here. Their control within specified limits ensures that the starter will adequately prepare the lamp cathodes for starting and that, when the lamp is burning, the starter will not affect its operation. They do not, however, yield any information on the suitability of the starter for actually starting a fluorescent lamp. To make an assessment of this important factor, it is necessary to know how the starter modifies the form of the transient voltage developed in the circuit and how this affects lamp starting. Until recently, few data have been available on this rather complex problem.

Lamp Starting and the Starter

An acceptance test based on the starter's ability to start an "average" fluorescent lamp within some given period of time may lead to serious discrepancies. Transients produced by the starter on successive operations are quite variable and the magnitude of the transient required to start the lamp depends not only upon the normal lamp manufacturing variations, but also on the lamp's past life and the ambient conditions at the time of test. Factors such as the length of time which has elapsed since its last operation, the relative humidity and the presence of conducting material near the lamp can influence the ease with which the lamp starts. The starting of a large group of representative lamps would yield dependable statistical data, but the time involved in such a test makes it prohibitive under production conditions where a simple "accept or reject" test is essential.

Transient Voltage Effects

As a gas discharge cannot be built up without the utilisation of energy from the electric field, it is natural to suppose that not only the amplitude, but also the duration of the transient voltage, plays an important rôle in lamp starting. This assumption has been borne out in practice; for instance, Brownell and Hinman[2] found that attempts to measure the peak value of the transient voltage by means of a cathode ray oscilloscope display system, led to inconsistencies between the measured voltage and the lamp-starting ability of the starter. This is due to the fact that peaks of high voltage and very short duration may be measured by non-selective methods of this type, and these have insufficient energy to start the lamp. F. H. Rixton[3] describes an oscillographic method

incorporating an integrating network, whereby, either the actual envelope of the transient or its area in volt-seconds could be displayed on the calibrated screen of the cathode ray tube. Oscillograms of typical transient waveforms obtained by such a method are reproduced in Fig. 3. When the starter capacitor is omitted, the voltage across the starter electrodes rises at the instant of contact separation and is sufficient to initiate a discharge in the starter. At this instant, ideal conditions for establishing an arc discharge exist, because the diminishing contact area immediately preceding the metallic break produces minute "hot-spots" capable of carrying an arc current. The gas pressure in the starter is, however, too low to concentrate the discharge sufficiently for the maintenance of the hot-spot temperature and the arc is thus quenched. By this time, however, most of the energy stored in the choke has been dissipated. The observed pulse occurs after the arc has been extinguished, so that the duration is consequently very short and there is little pulse energy.

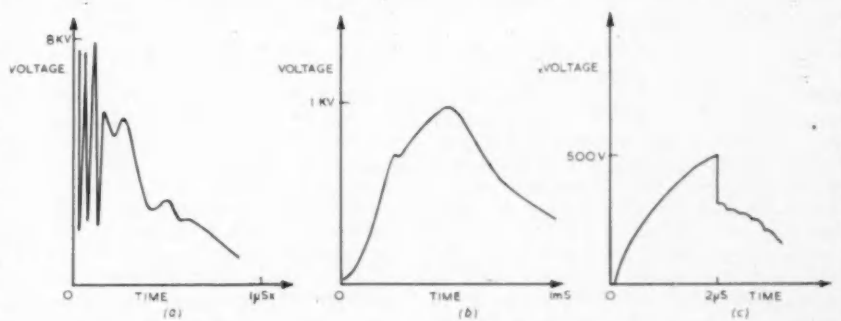
Effect of Capacitor

When a small capacitor is connected in parallel with the starter, the voltage will be zero at the instant of contact separation and the subsequent build-up delayed by the charging of the condenser. This delay is sufficient to allow the hot-spots of the last metallic contact to cool and make arc formation less probable. The discharge is thus in the form of a high resistance glow which is extinguished more readily than an arc, so that less of the available energy is dissipated in the starter. The waveform is dependent on whether the bimetallic electrode is positive or negative at the instant of break, the respective waveforms being shown in Figs. 3 (b) and 3 (c). Although the pulse amplitude is reduced when the parallel capacitor is used, the duration is considerably lengthened, and the pulse-voltage area increased so that more energy is available for lamp starting. The starting of the lamp is far more probable when the bimetal is positive than when it is negative on contact separation.

Measurement of the Transient

Whilst the above method yields valuable fundamental data on the mechanism of lamp starting, the complexity of the equipment detracts from its usefulness as a production tool. Brownell and Hinman [2] describe an ingenious and remarkably simple method for assessing the "lamp starting ability of the starter." An adjustable voltage divider is used to apply a portion of the transient developed across the starter, when it is operating freely in series with the lamp choke, to a small cold cathode glow lamp. A control dial is calibrated to indicate the transient voltage when the divider is so set that the glow lamp just flashes. By this means, the transient energy, as well as its peak value, is taken into account, the latter by direct measurement and the former by using the glow lamp as a selector, rejecting all pulses which have insufficient energy to initiate a glow discharge. The method relies for its accuracy upon the assumption that the conditions required for the establishment of a discharge in the glow lamp are essentially similar to those required for starting the fluorescent lamp. No

Fig. 3. Starter transients: (a) no parallel condenser; (b) parallel condenser—Bimetal positive; (c) parallel condenser-Bimetal negative



attempt is made to justify this assumption on theoretical grounds, but the high degree of correlation between the lamp-starting ability and the voltage measured by this means proves its validity.

Automatic Counting

This pulse selection principle has been applied in the automatic counting equipment shown in Fig. 4, which has been developed at the G.E.C. Research Laboratories. Six identical counting channels, each with its own selector diode and potential divider, are connected in parallel across the starter contacts. When a given diode flashes it sets up a train of reactions in its counting channel, which is terminated in an electromagnetic counter. The dividers are calibrated and set at different voltage values, usually multiples of one hundred volts, so that, after the starter has operated freely for a given time, the number of pulses whose peak values exceed each of the six fixed voltage levels, and which have sufficient energy to initiate a discharge, may be read off the counters. The numbers of pulses lying in each of five peak voltage bands are then determined by taking the differences of the readings on successive counters and a distribution curve drawn up. A large amount of valuable information on the performance of the routine production starters is thus obtained with the minimum of labour and skill on the part of the observer. A reliable assessment of the results of experimental batches can also be made quickly, using the results for normal starters as a standard. It should also be emphasised that the simultaneous counting of the pulses in the different bands eliminates errors arising from the random nature of the pulses, which would lead to inconsistencies if the peaks in different bands were measured on a single adjustable channel during successive periods of starter operation.

Pulse Manipulation

As mentioned above, the starter transient is a random quantity, whose magnitude and polarity depend on the point in the current cycle at which it is produced. Thus, before an electromagnetic counter can be actuated, considerable manipulation of the pulse is required. An electronic circuit for doing this without appreciably damping the transient is incorporated in each channel, a circuit diagram of a single channel being given in Fig. 4. Very briefly, each channel may be divided into three distinct sections, as indicated on the circuit diagram. Positive pulses are passed through section "A," and negative ones are inverted. Section "B" comprises a circuit which generates a square pulse when triggered by a positive pulse of any shape or amplitude. This pulse is used in the last section to fire a gas filled relay, which, in turn, operates the counter.

Circuit Operation

The function of the various units in the channels will now be considered in more detail. The selector diode is fed from the high resistance potential divider (R_1) connected across the starter, so that little loading is imposed on the transient. When the diode strikes, a voltage is developed momentarily across its load resistance R_2, and this is applied to the control grid of the phase splitter V_2. If this voltage pulse is positive, the valve current increases, giving an instantaneous rise in the cathode voltage and a corresponding fall in the anode voltage. A negative pulse will lead to a fall in the anode and a rise in the cathode voltage, since, in this case, the current through V_2 is momentarily reduced. Hence, irrespective of the polarity of the starter transient, a positive pulse is produced either at the anode or at the cathode of the phase splitter and this is selected by the double diode V_3.

A positive pulse, however small, is sufficient to trigger the "pipper" circuit comprising dissimilar valves V_4 and V_5, which produce a square positive pulse of constant amplitude in the following manner. Before the pulse is applied, the valve V_5 is conducting and the adjustable resistance R_3 is so set that the voltage produced across it is just sufficient to prevent V_4 from conducting. Thus, when a positive pulse is applied to the grid of V_4, it starts to conduct. This causes a fall in its anode voltage, which is fed, via the condenser C, to the grid of V_5. This reduction in grid voltage, together with the rise in cathode voltage due to the increased current through R_3, is sufficient to cut off V_5, giving an abrupt rise in its anode voltage. At the end of the pulse, when the grid of V_4 returns to earth potential, its current decreases and its cathode voltage consequently falls. At the same time the condenser C is discharging through the high resistance R_4, causing the grid voltage of V_5 to rise slowly. After a short time, depending upon the values of C and R_4, the valve V_5 will begin to conduct again, and cut off V_4.

In this way, a square-shaped positive pulse whose amplitude is independent of the form of that used to trigger the circuit is produced at the anode of V_5. This square pulse will fire the thyratron V_6, and pass a suitable current through the coils of the electromagnetic relay and counter. The relay is of the delayed

opening type, so that, by the time it opens and restores the circuit to its original condition, the pulse has been registered by the counter.

The choice of a suitable selector diode for the equipment is important, since the measurement relies for its accuracy on the fact that the diode will always strike at the same peak values of the applied voltage. Since the transient voltage may be of either polarity, this ideal state can only be approached by a diode with a symmetrical electrode system. The NT2 type gas-filled cold cathode diode was chosen as a suitable valve for the equipment, and individual valves are selected for consistent d.c. starting voltage when either electrode is the cathode.

Calibration

The potential dividers which control the sensitivities of the six counting channels are calibrated in the following manner. A 50 c/s a.c. voltage of known peak value is connected across them, and the sensitivity of each is increased in turn until the appropriate diode strikes. The channels are normally calibrated from 400 to 1,200 volts at intervals of 100 volts.

Care was taken in the design of the equipment to ensure adequate decoupling of the h.t. supply between successive valve stages, thus preventing pulses from being fed back to the beginning of a channel and so operating it again. Erratic behaviour of the counters due to oscillations being set up in the channels is eliminated by the use of 470 and 1,000 ohm "grid stoppers." The potential dividers and selector diodes are also screened from the remainder of the circuit to prevent pick-up by the counter circuits from the dividers without the diodes striking. As a final precaution against spurious counts, the h.t. supply is stabilised so that the bias voltage of V_4 is kept constant, very small variations in this voltage being sufficient to actuate the high sensitivity pipper circuit.

Transient Counter Operation

The equipment is at present being used at the Osram-G.E.C. Lamp Works to build up a comprehensive picture of the performance of the types of glow starters which are produced in large numbers. This long term investigation will provide reliable statistical data on the value of the starter transient necessary for satisfactory lamp starting. It may then be possible to phrase a test schedule in such a way that a simple "accept or reject" test can be carried out on a small fixed percentage of the factory production, using a single channel equipment pre-set at an agreed voltage. Such information should be of considerable value in the preparation of the B.S.I. specification for starter switches, which is at present under discussion. The equipment is also a useful tool in the development laboratory, since a means for measuring the value of the transient is essential in work connected with improvements in starter design and the development of non-standard types for special applications. It should also be emphasised that, although the above discussion has been limited to the glow type starter, the method is equally applicable to the measurement of the performance and derivation of statistical data for thermally operated and other forms of lamp starting devices.

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1 Knott, R. D. and Hudson, J. W. P.: The Electrical Times, June 9th, 1949.

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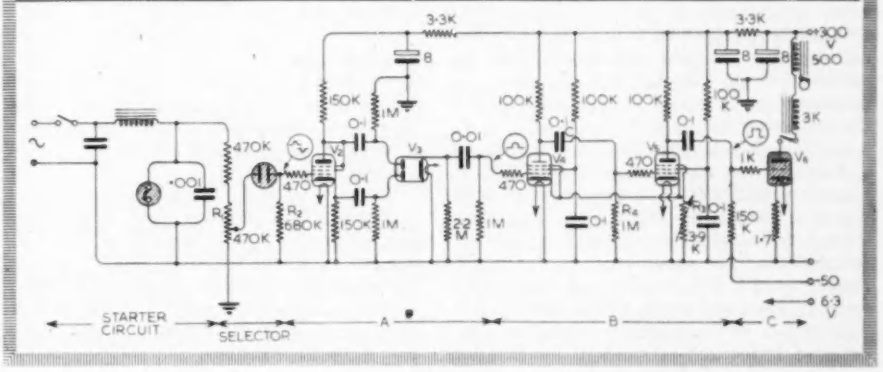
3 Rixton, F. H.: Illuminating Engineering, *44*, 21 (1951).

Fig. 4. Circuit diagram of single counting channel



Maintenance in American Factories

Methods are Undergoing Many Changes

HOWEVER well organised a production plant may be in original conception and equipment, it will not operate for long at a high efficiency unless careful attention is given to maintenance. It is fitting, therefore, that one of the last of the productivity teams to have visited the United States under the Anglo-American Council on Productivity programme should have been concerned with this important subject. The report of this team has now been published, and although it presents no startling conclusions, it well repays detailed study by both production executives who wish for an outside check on their maintenance organisation, and by maintenance engineers who are interested in the details of American methods.

It is emphasised in the report that maintenance is not an end in itself; this truism has a great effect on the attitude of management to its maintenance organisation. Nevertheless, in the broadest sense the purpose of maintenance is to safeguard an investment, and to that extent it is a continuous and not an intermittent function. This is the consideration behind the development on both sides of the Atlantic of so-called "preventive maintenance."

Direct Responsibility

In the opinion of the team, the person responsible for engineering activities in a plant, other than those directly associated with production, should be directly responsible to the chief production executive of the works, and should thus be of equal status with the head of the operating or production department. The clarity with which American firms were found to define the extent of authority of individual members of the staff, together with the route by which that authority was delegated was found to be impressive. It was felt that it would pay U.K. managements to review their policy on this particular matter.

On both sides of the Atlantic, the team found a fear that the better organisation of maintenance would involve a disproportionate increase in the cost of clerical and similar overheads. It is suggested in the report that rationalisation of paper work is the correct answer to this danger, and the report gives some guidance on methods of achieving this. This is felt to be largely a matter of well-designed forms and of methods for handling them. An extension of this aspect of maintenance management is the use of work study as a check on the efficiency of the labour force employed, the total being compared against predetermined standards.

Maintenance Budget

Preparation of a maintenance budget in some considerable detail is felt to be possible and, indeed, desirable. Such a budget can become the authorisation for a large amount of the work of the maintenance section. Moreover, a budget of this type gives top management a means of knowing the significance of maintenance costs as an element of production costs; it becomes increasingly important as development proceeds from "breakdown" to "planned" maintenance.

Two main points of technical policy in the maintenance field were noticed in the United States. These were the provision of adequate maintenance workshops, and the employment of labour-saving devices such as mechanical handling equipment and mechanised transport.

Methods of labour recruitment and training in the U.S. are in general different from those adopted in this country, but the team sees no reason for recommending them for the conditions prevailing here. In particular, the absence of adequate training schemes is now being felt in the U.S.A., and it is quite possible that there will be some striking changes from existing methods of gradual progression "on the job."

Incentive Bonuses

There was little evidence that incentive bonuses were popular or common in the States, and they were not of the opinion that the wider adoption of such methods in this country would be desirable. They emphasise that the introduction of work study methods does not necessarily presuppose the introduction of an incentive payment scheme.

Summing up, it is difficult to avoid the feeling, on reading this interesting report, that the team found that industry in the United States was actively examining and modifying its own ideas on maintenance systems. As a result, the report is more a record of tentative, though creative, thinking on the subject, than a review of tried and successful methods.

From AN ENGINEER'S NOTEBOOK

There is no public group more susceptible to "gadgets" than the motor industry. The modern car is full of them, while from the number of devices advertised for economising petrol, one might conclude that by fitting all of them the car would produce petrol instead of using it. One of the latest "gadgets" I have come across is a device which automatically adjusts the car's lighting to the driving conditions at that instant. It makes use of a photo cell mounted on the windscreen to provide the originating control. A multiplier unit is incorporated in the cell and the output is used to control the dimming of the headlights, thus relieving the driver of all responsibility in this respect. It is said to act in accordance with the level of illumination on the road, switching on headlights on darkened stretches of road, and dimming in face of oncoming traffic. If only it had an additional radio transmitter to dim the headlights of approaching cars I feel it would be accepted more enthusiastically. Conditions for seeing are very much a personal factor, and I am not at all sure that a satisfactory response would be obtained over the range of the three light qualities that are in use on the principal British roads today. No, a satisfactory solution of the use of headlights for night driving must be sought in some direction more fundamental than the fitting of just another gadget.

* * *

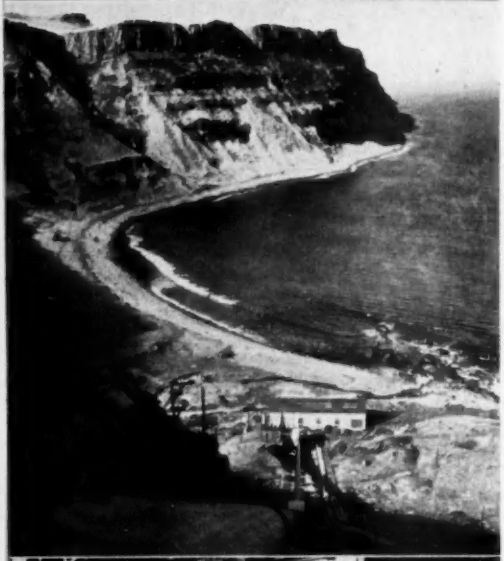
What seems to be a delightful method of presenting a visual picture of minute bodies has been developed by the use of colour in electron micrography. On first thoughts this sounds something of an impossibility, for the practice in the use of electron microscopes is to use beams of as "monochromatic" character as possible. However, the aim is not to produce anything resembling micrographs in natural colour, but to permit the superimposition of two or more images. The need for this is found in cases where an object has widely differing degrees of opacity, requiring different accelerating voltages for their resolution. Thus, in bacteria, flagella may require a different wavelength of beam from that necessary to reveal the internal structure of the organism concerned. With the colour technique, the two or more micrographs are produced as required, and they are then treated as colour separation negatives for the preparation of a final colour print which will show all the features in the several micrographs. Judicious selection of colours can also help to give an impression of depth, and help the production of stereoscopic electron micrographs. The parallel with colour photography must, however, not be stretched too far. True, the technique of preparation of the final print is identical but in the present case the colours are chosen arbitrarily by the operator, and offer a closer parallel to the staining of microscope slides. The method is one that has obvious merits, and it has, I feel, the unusual distinction of a simple demonstration of how a technique in one field can be successfully adapted and exploited in another.

* * *

For those of us who like our facts neatly ticketed and pigeon-holed, such an incongruity as insulating material which can be used as a conductor provides a difficult problem of classification. I have lately been reading something of the conducting films on glass which are produced by exposing the surface to the vapour of certain compounds of tin. When they are deposited on the surface of glass to a thickness of about 2×10^{-5} in., these appear to have a resistivity of the order of 120 ohms per "square." I was puzzled at first by the omission of any dimension for the surface, but a little playing with Ohm's Law soon showed that a square mile and a square inch would have the same resistivity. This conducting glass is already finding commercial application in the production of anti-misting windshields for aircraft, and something of the sort is used in the Sylvania luminescent panels which are the lastest novelty in light sources. No doubt many other uses will be found in time, for it is part, even though a relatively simple one, of that strange world which lies between conductors and insulators, a region that is still largely unexplored. This field has already given us the barrier layer cell, the metal rectifier, the crystal triode and many variants thereon. What other new tools will it yield when the obscure theory of electrical behaviour in such materials is fully understood? E. R. G.

THE YEAR IN

STEADY PROGRESS



DESPITE the tragic shadow of the death of King George VI, 1952 as a whole was a far from sombre year. Sandwiched in between the national celebrations of the 1951 Festival and the 1953 Coronation was a twelvemonth of solid progress in many directions for the electricity industry, in spite of numerous difficulties which had to be overcome. One of these provided the subject for the first editorial note of the year's first issue; this was the Treasury's request to banks to limit credit facilities.

Evidence of the determination of the industry to overcome its problems was shown early, for it was in January that the Midlands Electricity Board successfully used a helicopter to run a 1,280 ft span of a 66 kV line in the Malvern Hills. Another difficulty which was combated with increasing success, is recalled by an article in our columns from Professor F. E. Simon under the heading "The Case Against Electric Heating." Throughout the year the counter-attack on the part of the electricity industry against this attitude grew in vigour, as prominent engineers spoke on the subject.

Government Orders

At the end of January, a revived B.E.A.M.A. Annual Dinner—the first for 14 years—attracted a great company to Grosvenor House. In February, another considerable gathering attended the E.C.A. Dinner, and heard the Minister of Labour explain and defend his newly-made Notification of Vacancies Order, which was causing the industry some concern. There was one other Order published that month which in the event gave more trouble: this was the Hire Purchase Order which limited the hire period permissible for many electrical domestic appliances. On the credit side during the month may be noted the completion of the first stage of the Manchester-Sheffield-Wath railway electrification scheme.

March brought a promise of spring, and with

At the top is seen one of the new electric locomotives used on the Manchester-Sheffield electrification scheme. Next comes a view of the Storrs Loch hydro-electric scheme, Isle of Skye, inaugurated during the year. Finally, at the bottom is the M.V. gas turbo-alternator commissioned by the B.E.A.

RETROSPECT

BY THE INDUSTRY

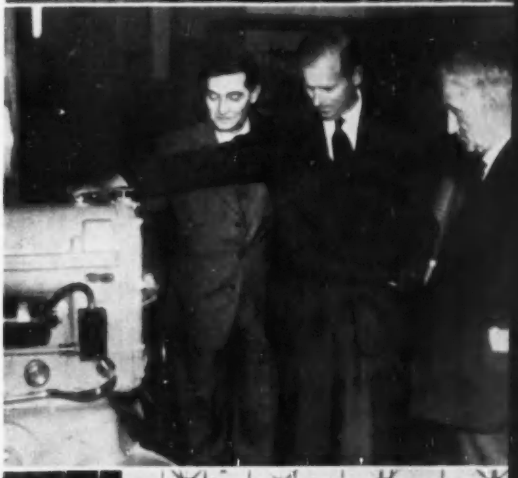
it a surprise early relaxation of the 7 a.m. to 7 p.m. ban on advertisement and shop-window lighting. In Parliament, a Bill to deal with the guarding of heating appliances was introduced and accorded a general welcome. The House of Commons was again concerned with electrical matters a few weeks later, when there was a short and rather non-committal debate on coal utilisation. Farther afield, Government action in Australia, which severely cut imports from this country, struck another severe blow at manufacturers of electrical appliances. Wholesale and retail traders in this country were affected by new restrictions on imports of electrical goods which were imposed following the Chancellor of the Exchequer's budget statement.

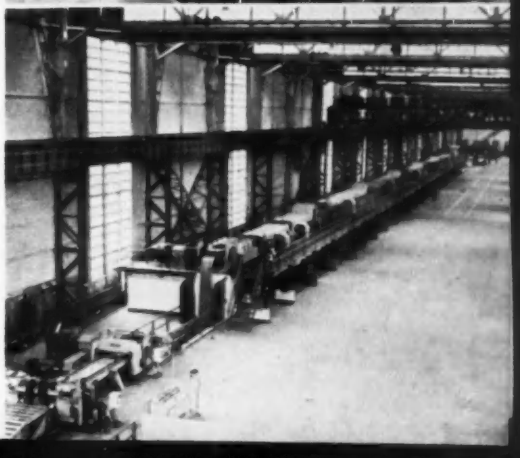
Successful Exhibition

A March landmark was the resoundingly successful Electrical Engineers' Exhibition, which was organised by the A.S.E.E. Central Regional Council. Despite a snowstorm and bitterly cold weather this attracted a good attendance at the New Horticultural Hall. Early in April, this "first" was matched by a "last"—the specially constructed Kingsway tram tunnel was closed, as part of the London Transport Executive's change-over to buses. At about the same time—there was no connection—the I.E.E.'s East Midlands Centre with admirable initiative organised a Convention on Contacts which resulted in a valuable exchange of ideas between specialists on the subject working in various fields of engineering.

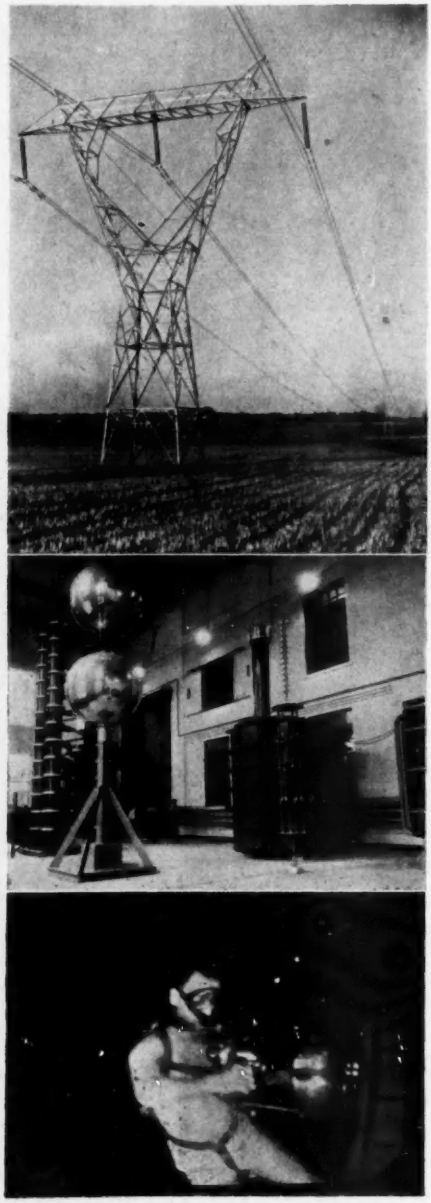
Electrical plant was added to the Monopolies Commission's list for investigation in April, a move which pleased few in the electrical industry. Other news which we recorded during that month dealt with items as diverse as a new B.E.A. £150m share issue, a new type of harpoon for electrocuting whales, and the extraction of metallic germanium from coal dust.

For the main centre of interest during May it





Laying lines with the aid of a helicopter is pictured at the top of this page, while below is seen the Duke of Edinburgh opening the Glen Affric power station of the North of Scotland H.E. Board. The pickle line at Trostre tinplate works is shown in the final photograph in this strip



During the year, work continued on the 275 kV Super-Grid, one tower being seen at the head of this page. Centre is a view of the Brush h.v. laboratory which was opened in August, while below is a view on a TV screen from an under-water camera

is unnecessary to look farther than Castle Bromwich, Olympia and Earls Court — in fact, the B.I.F. This was somewhat smaller than in earlier post-war years, and our final review of the electrical section at Birmingham noted "business brisk, but not so intense as in previous years." Perhaps a more exciting development during the month was the courageously outspoken address delivered by Sir John Hacking at the Institute of Fuel luncheon, when he not only defended the electric fire, but attacked many other methods of domestic heating. Underlining some of his arguments were the yearly power-station efficiency figures published shortly afterwards, which gave 29·39% at the top of the list.

Productivity

Amongst May casualties was the Anglo-American Council on Productivity, which held the last meeting of its useful existence during the month, though the British side of the Council has continued in another form. A remarkable example of high productivity revealed during the month was the complicated new machine which gave to the Glass Bulbs, Ltd. works an output capacity of 1,500,000 lamp bulbs per day. Other events of the month included a widening of the A.S.E.E.'s membership scope to include "electrical technicians," and an extension of the "fires" controversy to a B.B.C. discussion programme.

June provided busy occupation for prominent members of the supply industry. C.I.G.R.E. followed closely by the truncated B.E.P. convention occupied a prominent position in our pages. Amongst many items discussed at Paris was one which specially captured the imagination of engineers; Electricité de France's unconventional suspended circuit-breakers. At Bournemouth, where the British Electrical Power Convention was held, the main item of interest was never in doubt : the need to fight for freedom of domestic electrification gave a pleasing liveliness and purpose to sessions that that were far too limited in time. The general agreement on this last point was made publicly apparent at the annual general meeting of the Convention on the last day.

An important development abroad during the month was the announcement of Canada's determination to proceed with the St. Lawrence Seaway and Power project even in the absence of United States co-operation.

The second half-year began with a sharp report by the Monopolies Commission on the supply of insulated electric wires and cables. Although it was admitted that the C.M.A. had

played a prominent part in establishing the high reputation of the British cable industry, some of its agreements were stigmatised as being "contrary to the public interest."

Cross-Channel Cable

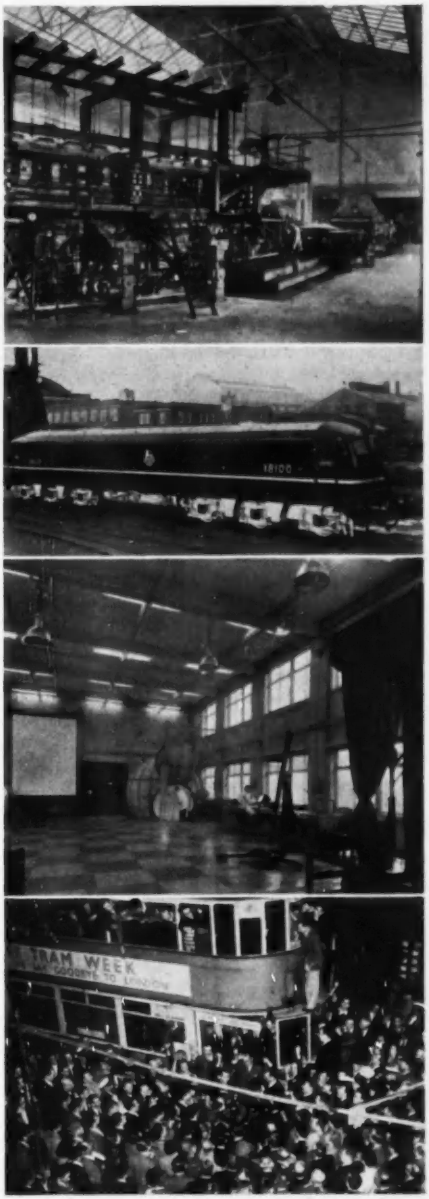
Eastbourne was the venue during July of a successful E.C.A. conference at which even the unpromising subject of accounting gave rise to a lively discussion, while ideas on discount policy produced some outspoken exchanges. It was announced during the month that the joint technical committee of the B.E.A. and E. de F. had reported favourably on the plan to link the two supply networks by a cross-channel cable. This was stated by the Minister of Fuel and Power during a debate on departmental matters in which Government and Opposition could find little substance for contention.

In general, July and August were quiet months as usual. Isolated matters of interest in the industry arose from time to time, such as the I.E.E.'s publication of wiring rules interpretations, and official Ministry of Works recommendations for economy in electrical installation materials and methods. During this period occurred the official opening of the Brush Co.'s new high voltage laboratory, and the commissioning at Manchester of the first gas turbo-alternator to go on load. A sombre note, was added by the Lynmouth flooding disaster, during which the best traditions of the supply industry were ably upheld by the local engineers. Demonstration of the sheathing of cables with aluminium attracted interest during the month.

Ridley Report

September saw a quickening of the pace in the industry and the Radio Show was a forerunner of autumn's exhibitions. The British Association, meeting in Belfast, included some interesting electrical papers in its programme, while the A.P.L.E., in conference at Harrogate, had road safety as a prominent public problem to add importance to its deliberations. The outstanding event, however, was the publication of the report of Lord Ridley's committee on a national fuel and power policy, which put an end to much speculation. Though not without its blemishes, it presented most aspects of the electrical case far more fairly than had been expected, and upheld the essence of the electrical case—"freedom of choice."

Our readers can probably readily recall the more recent events of the last quarter of the year. It will suffice here to note that it was fully as eventful as those preceding it.



One and a half million lamps per day is the output of the machine shown at the top of this page. Below it is a new gas turbine locomotive by Metropolitan-Vickers which was introduced during 1952. Benjamin's new lighting laboratory comes next, with, finally, London's last tram

PRINTED CIRCUITS

A Technique for the Future

SOME time ago, in our issue of September 4, 1952, we published a short article dealing with the application of printed circuit technique to the manufacture of strain gauges. This application is, however, only one of the many uses which are now being found for this system, which, as it becomes further developed, is becoming useful in ever wider fields.

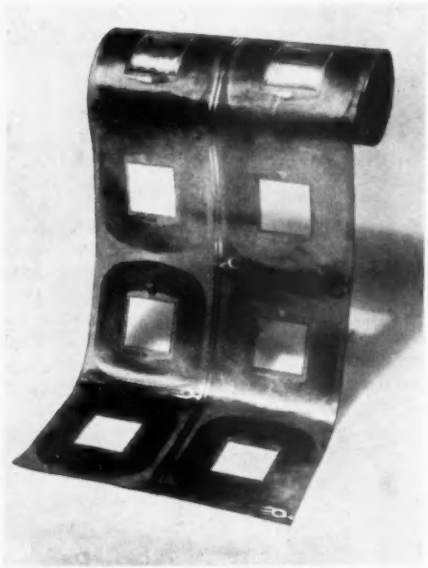
The Process

To evaluate the advantages and limitations of the system it is desirable to understand the basic process adopted in the manufacture of printed circuits. Investigation into methods of producing a conducting pattern on an insulating base began in about 1941 and it was soon clear that the use of metal foil bonded to an insulating base, and its subsequent conversion into the desired pattern by intermediate processes of printing and etching, produced circuits having the best electrical and mechanical characteristics. The following system is used by Technograph Printed Circuits Ltd., of 38 Shaftesbury Avenue, W.1.

Taking a simple example of a circuit in which conductors do not cross, the first step toward production is the preparation of a drawing, in black and white, drawn to scale, showing the electrical pattern exactly as it will be finally produced. A printing plate is then prepared from the drawing by normal photo-mechanical means as used in an ordinary printing operation. The image is then printed in a special ink on the metal foil, which has been bonded to an insulating base, and the resultant product is then etched to remove all surplus material. The ink used must be capable of printing a sharp, clean image, without pinholes, and must be a perfect resist to the etch solution.

Special techniques have been produced to prevent excessive "undercut" which may have great importance in closely patterned figures such as induction coils, and in some cases electro-etching is used in preference to direct chemical means. From the etching stage the circuits are thoroughly cleansed, followed by a treatment to neutralise all etch residues.

The above is, of course, only a brief outline of the process as applied to the simplest circuit. Where crosses are unavoidable, the printed sheet is coated with metal on both sides, making, effectively, a sandwich with a resistance filling. The "crosses" can then be dealt with by printing two separate circuits, one on each side, and connections made through the plastic filler by hollow rivets or pins. For still more complex circuits two sheets may be used, providing four separate circuits, and through connections again made. In fact, the complete circuit, excluding, of course, components, etc., for a large television receiver can be made.



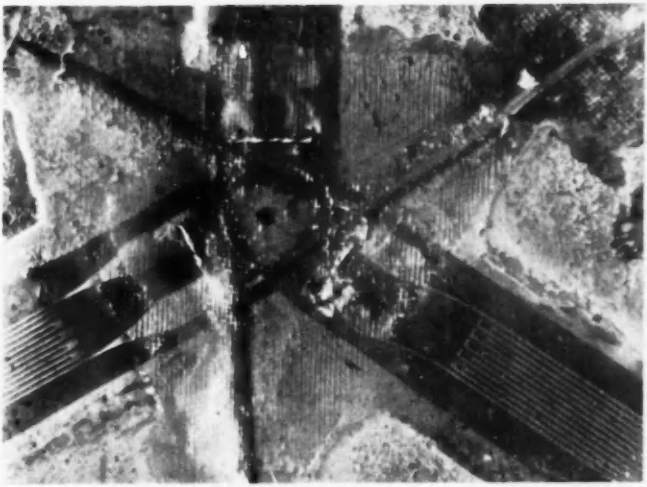
Printed circuit for a transformer winding

Advantages

The first and most obvious advantage of the system lies, of course, in its application to bulk production, where the printed circuits can be run off in numbers from a printing press with its high rate of output.

Secondly, as every circuit is essentially an accurate reproduction of the original, automatic or semi automatic methods of assembly can be introduced, as the circuits can be precisely registered for special machines to operate on them, performing such functions as the insertion of valves, etc.

Thirdly, as there is available a wide range of base materials, ranging from polythene sheet of comparatively small thickness up to such



Here is a test arrangement of three printed strain gauges. Note the ease of soldering connections

products as Fibreglass bonded laminates, it is possible to introduce any reasonable degree of mechanical strength into the circuit. Thus in electronic circuits the metal chassis can be dispensed with, together with the tooling-up costs and storage space charges.

Folded Circuits

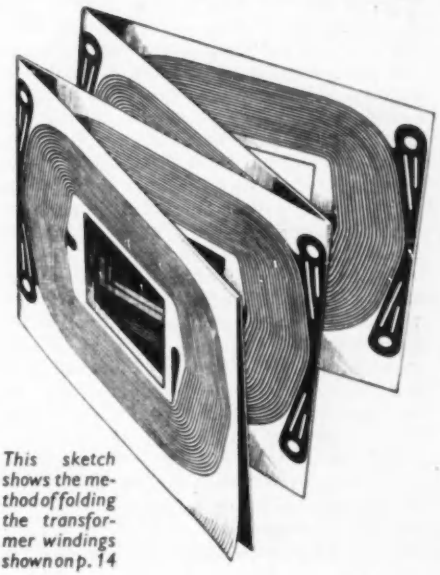
From the basic concept of the printed circuit has been derived the new technique of folded circuits. This system is of such basic simplicity yet so fundamentally different from accepted practice that it is best illustrated by a simple example.

In the manufacture of small transformers it is conventional to use wire of the same gauge throughout for any particular winding. This results in uneven and sometimes undesirable temperature gradients within the body of the winding, and also to the use of more copper than is necessary. In the Technograph system the windings can be produced in the form of coil patterns formed from thin copper foil on a base of thin but strong insulating material such as specially impregnated paper. Such patterns can be produced in reels of lengths up to hundreds of yards, from which can be cut the requisite number of coils for any particular design. Connections are made between each of the printed circuits by a spot welding technique, and the strip is then folded concertina wise to form a pack and the centre punched out to take the core. Considerable space saving is possible by this form of construction as the winding is effectively in strip form. An even greater advantage is that the surface area of the inner windings can be made wider than those of the outer ones and a much improved thermal gradient established.

It can be seen that, although the process is considerably more complex, the system outlined above can be applied to most problems involving windings, and work is at present in hand to use it for the windings of motors. Field windings in this case are, of course, simple, but with armature windings some modification in existing methods of construction may be necessary to permit entry of the printed circuits in the slot.

Flexible Circuits

Flexible circuits can also be used for heating purposes, using heat-resisting bases and resistance metals. These printed circuits which can be produced in the form of mats or tapes, have many applications in the scientific world. One of the more recent uses of these mats is in



This sketch shows the method of folding the transformer windings shown on p. 14

the tail assembly of the Bristol Britannia air liner, where they have been built in to prevent icing-up. Foldable circuits can also be used to facilitate the assembly of miniature components. All connections can first be made to the circuit on the flat and then the whole assembly can be rolled up or folded up to a size and shape dictated by the mechanical size and disposition of the components, or by electrical or thermal considerations.

Printed Components

Readers may recall that there have been many attempts, some with a good degree of success, to introduce "printed" capacitors and resistors into the circuit. Generally, the base is used as a dielectric for the capacitors and a special resistance ink for the resistors. In the view of Technograph Ltd., however, the range of values which can be produced is too limited and the reliability of such components too uncertain for production of standard items. Anything less than complete reliability of circuits with integral components is unacceptable, as in the event of a component failure the complete circuit would have to be scrapped.

Apart from the purely electrical aspect of the subject, there are a number of other uses for the printed-circuit technique where present-day methods involve the use of complex mechanical means. Thus certain types of slipring assemblies can be produced, special wave form generators devised, lenses can be patterned with metal and complex profiles accurately and rapidly made. The method may be applied to glass bases, producing special patterns for photo-electric scanning with a high degree of accuracy, and here an advantage is that the printed pattern is completely opaque to light and has an absence of "fringe" effects inescapable from direct photographic methods.

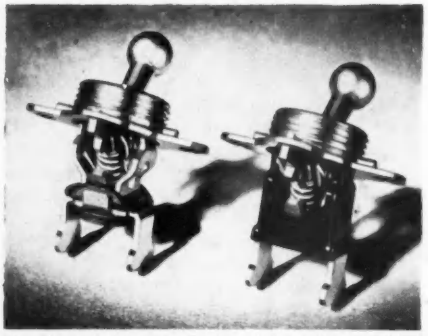
To the electrical engineer, the main point of interest lies in the current-carrying capacity of the circuits. Owing to the high surface area available, heat is easily dissipated with the result that the metal can be run at remarkably high current densities. At the moment, currents of two or three amperes can be handled with ease on even fine lines, and higher currents can readily be catered for. To the economist the cost of the system is of importance. Here a major point is that by a special process it is quite unnecessary in the experimental stage to incur the cost of making printing plates. Test circuits, identical with those produced by bulk production, can be made from original drawings. A further point in economy is that the etching process is so devised that lost metal can be recovered as foil of any desired thickness and the etching solution regenerated.

Nylon for Switches

INVADING a field almost entirely the prerogative of mica, solid moulded nylon has now been adopted as the standard material for the insulation of contacts in household tumbler switches made by J. A. Crabtree and Co. The use of nylon obviates many of the difficulties associated with the fabrication of mica insulators. Whereas, using mica, the switch assembly has to be built up in several stages to attain a satisfactory degree of accuracy, nylon components may, quite simply, be moulded in one operation.

Although the search for a satisfactory replacement for mica has occupied the attention of the company for some considerable time, it was not until 1950 that the possibility of nylon was first suggested. Since then, tests on this material have indicated that, both mechanically and electrically, it is satisfactory. It is claimed to resist corrosion by oils and acids, and to have a higher electrical breakdown value than many other synthetic materials. Experience in the domestic sphere has demonstrated its resistance to abrasion. As previously mentioned, components fabricated from nylon can be manufactured in a single operation, enabling the whole assembly to be constructed to closer tolerances.

Although the company intend to use nylon in all models of tumbler switches, so far only 5 amp type a.c.-d.c. flush-mounting patterns have been modified.

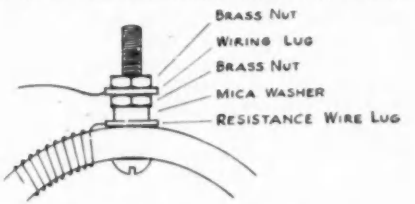


The old and the new. On the right is the moulded nylon assembly

PROBLEMS AND PRACTICE in Engineering

Careless Assembly

TROUBLE on the field circuit of an alternator was traced to an open circuit on the rheostat of the automatic voltage regulator controlling the alternator. Careful examination of this rheostat disclosed that mica washers



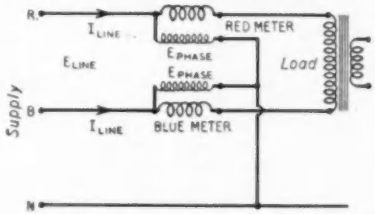
Mica washers assembled in terminal

instead of brass washers had been fitted on the terminals of the rheostat which took the wiring lugs. The brass terminal then relied on the terminal itself rubbing against the internal diameter of the hole in the lug to which is soldered the end of the resistance wire. On checking the rheostats of two other generating sets, they were found to be fitted in the same manner.—*T. Young.*

Meter Problems

THE two cases of "negative units" mentioned by your correspondent R.F.K. (Our Readers' Views, November 13) are similar to one with which I was confronted a year or two ago. In this instance a report had been received that one of two single-phase meters measuring the consumption of welding equipment at a blacksmith's shop had shown negative registration since installation.

Investigation showed that all metering connections were correct, but that on check loading tests the meter connected in the red phase rotated in a reverse direction. The welding transformer was of the 2-phase type, correctly connected across red and blue phase lines.



Use of single-phase meters on a 2-phase supply

As the algebraic sum of single-phase metering registrations must always be correct and give the total consumption for any types of two- or three-phase loadings, it was, therefore, necessary to ascertain the voltage and current phase relationships existing in each meter, and in order to obtain a clear picture of measurement conditions it was also necessary to deduce mathematical proof that for any load phase angle φ, the summation was correct.

The problem was then treated as follows:—

Total power absorbed—$E_L I_L$ cosine φ watts.

Diagram 1 shows, for reasons of illustration, conditions existing for load unity power factor.

Power registration:—

Red phase meter

$P_R = E_{R-N} I_L \cos 30°$ watts.

Blue phase meter

$P_B = E_{B-N} I_L \cos 30°$ watts.

Total registration:—

$= P_R + P_B$

$= 2E_P I_L \cos 30°$ watts

($E_{Phase} = E_{R-N} = E_{B-N}$).

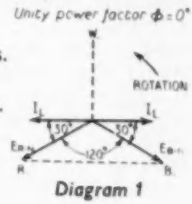


Diagram 1

$= \sqrt{3}\, E_P I_L$ watts $\left(\cos 30° = \frac{\sqrt{3}}{2}\right)$

$= E_L I_L$ watts ($E_L = \sqrt{3}\, E_P$)

Diagram 2 shows conditions for any phase angle φ lagging.

Power registration:—

Red phase meter

$P_R = E_P I_L \cos (30+\varphi)°$ watts.

which, on expanding

$= E_P I_L$ (cos 30 cos φ— sin 30 sin φ) watts.

Blue phase meter

$P_B = E_P I_L \cos (30-\varphi)°$ watts

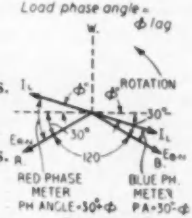


Diagram 2

which, on expanding

$= E_P I_L$ (cos 30 cos φ + sin 30 sin φ) watts.

Total registration:—

$P_R + P_B = E_P I_L \cos 30 \cos \varphi - E_P I_L \sin 30 \sin \varphi + E_P I_L \cos 30 \cos \varphi + E_P I_L \sin 30 \sin \varphi$

$= 2E_P I_L \cos 30 \cos \varphi$ watts.

$= \sqrt{3} E_P I_L \cos \varphi$ watts $\left(\cos 30° = \frac{\sqrt{3}}{2}\right)$

$= E_L I_L \cos \varphi$ watts.

From Diagram 2 it can be seen that for a load phase angle φ exceeding 60° lag., then the phase displacement between voltage and line

current on the red phase meter will exceed $60°+30°=90°$ and thus reverse registration will occur, but as under any conditions the algebraic summation of registrations is correct, red phase negative registration should be *deducted* from blue phase positive registration.

The above treatise would appear to answer R.F.K.'s problem so far as negative units and low forward registration of one meter is concerned. The apparent reason for reversal when the fan was disconnected would be that whilst connected, the resultant current vector would be located at an angle less than 60° lag, whereas upon disconnection and registering refrigerator load only, the angle of lag must have been greater than 60°. The same theory is applicable to case 2 where, with the transformer on load, the angle would be less than 60°, and off load greater than 60°.

Though this method of metering is technically sound, there exists the risk of confusion in accountancy departments when dealing with negative units, and also there exists the possibility of misreading on the part of meter readers. It is advisable, therefore, to install a suitable single-phase meter having a potential coil designed for between phases connection, or alternatively to use one element of a three-phase, three-wire meter, though this practice is, of course, wasteful.—*K. B. Potter.*

Infra-Red Heating

SOME weeks ago a particular item of plant housed in a remote spot was thoroughly soaked after a heavy rainstorm had caused the roof gutters to overflow, allowing the rain water ingress to a motor and its control gear. To remove the equipment for drying out, owing to its situation and the limited time the plant could be out of service, was impracticable, so drying out by the use of infra-red lamps *in situ* was resorted to.

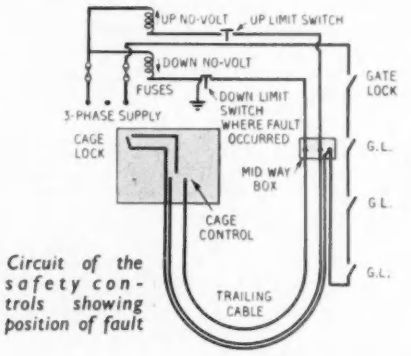
Four 250 W lamps with internal reflectors and improvised adjustable brackets were used for the purpose. The motor end plates were removed and one lamp placed at each end, its rays directed diagonally across the windings, similarly with the control gear whose doors and back plates were removed and one lamp placed at front and rear. The direction of the lamp rays were moved slightly from time to time to avoid hot spots with possible damage to insulation or soldered connections. After several hours drying time the lamps were removed, the windings allowed to cool, and the insulation resistance measured, a final value of 1·25 megohms being obtained.

This convenient method of drying was successful and the plant was again in operation within twelve hours, since when the method has been used twice in other cases to improve insulation resistance where damp conditions prevail, and has proved very adaptable and of considerable value even for short periods of between two and three hours during normal plant stoppages.—*T. H. Snelson.*

A Trip on a Lift

WHEN I was working at a mill in Bolton, the engineer asked me to look at a fault that had developed on a passenger-goods lift. The engineer then explained to me, how the operator had brought the lift up from the ground floor to the first floor, where he left to go about his business, leaving the cage and the first-floor doors open. When he returned he found the lift on the ground floor with the first-floor doors still open and the cage doors still open.

On inspecting the controls panel in the gear house, I found the main limit switch had stripped out. This told me, as the lift was still on the ground-floor level (which was the lower



Circuit of the safety controls showing position of fault

limit of its travel), that the lower limit switch was not operating. Inspecting this switch, I found that the moving contact which is in the form of a brass washer mounted on a rubber bush, had worked loose, causing the two fixed contacts to go to earth.

This made a circuit from one of the phases, through the down no-volt coil, through to earth, giving $V/\sqrt{3}$ across the coil, which was sufficient to operate it. The accompanying drawing will also help to explain the fault. Most of the control panel has been omitted as it was not necessary to show this fault. Incidentally the operator actually fell from the first floor on to the top of the cage, luckily he was not hurt.—*F. Hartley.*

A Mobile Substation

—SPECIAL PLANT DESIGNED FOR VENEZUELAN OILFIELDS

NOW on its way to the Shell Petroleum's oilfields in Venezuela is a large mobile substation built by Messrs. Reyrolle Electrical Plant Co., Ltd., of Newcastle-upon-Tyne. This unit, with a capacity of 4,500 kVA, has cost about £17,500 and will be used in the oilfields around Lake Maracaibo.

In these oilfields, the main electrical transmission system consists of double primary lines operating at 33 kV, 3-phase, 60-cycles with a length of some 60 miles. Off this backbone are secondary branch feeders operating at 6·9 kV. To provide power for these secondary lines there are some 14 static substations which step down the voltage from 33 to 6·9 kV. Many of these substations are, due to recent developments, reaching full loading capacity.

Substation Equipment

It was therefore decided that as oil production requires an adequate and continuous supply of electrical power, a mobile substation could fill a number of useful purposes. Complete in itself, it could augment or replace any existing unit on a temporary basis. Alternatively, it could be used to provide a temporary supply in undeveloped parts of the oilfield not supplied by a permanent substation.

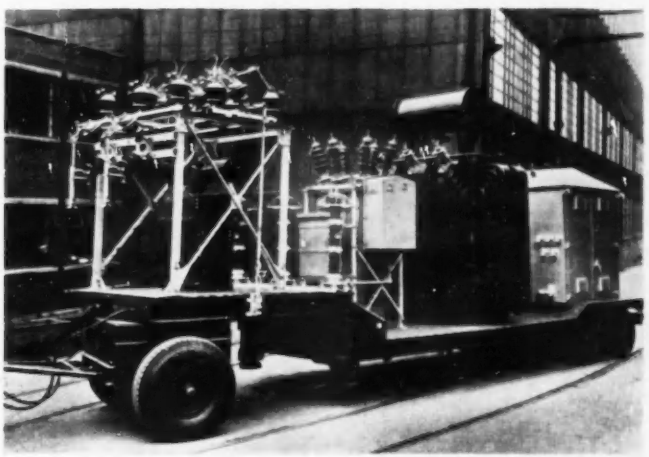
All main items of plant, including a 4,500 kVA unit, an auxiliary 15 kVA single phase transformer, 33 kV switchgear and all necessary control gear are mounted on a 40-ton 20-wheel trailer. Overall dimensions are 38 ft. long, 10 ft. wide, and 16 ft. high. The power transformer; 4,500 kVA, 3-phase, 33/6·9 kV is connected delta/delta and provided with an off-load tapping switch. The auxiliary transformer of 15 kVA has a voltage ratio of 33/0·23 kV. Both these items were made by C. A. Parsons and Co., Ltd.

Switchgear consists of one 33 kV Reyrolle outdoor circuit-breaker rated at 500 MVA and two 6·9 kV metalclad units connected to the 6·9 kV side by flexible cables. Protective gear for 33 kV is fed from a tripping battery charged from a rectifier on the 230 V supply. Protective and metering equipment for 6·9 kV is also incorporated as well as external plug points for 230 V for local lighting and power.

The 33-kV lightning arrestors of G.E.C. manufacture are mounted on resilient floor pads and the 33 kV line isolator and fuse isolator (the latter for controlling the auxiliary transformer) were manufactured by Messrs. Switchgear and Equipment, Ltd.

The whole of the equipment is mounted on a 40-ton flat, low-bed type trailer manufactured by R. A. Dyson Co., Ltd., and which has a fully compensated bogie with two pairs of short oscillating axles, each pair being mounted on a rocking beam so that full load distribution is obtained when traversing uneven ground.

Accessory equipment is also provided to accompany the trailer and includes a portable safety fence to be erected around the substation when it is in commission; earthing rods and connections and six cable drums each complete with a length of 6·9 kV trailing cable with appropriate terminal clamps provided at each end of the cable.



The mobile substation completed for testing is pictured here

overseas news

Transformer Manufacture

The Canadian Westinghouse Co. has announced plans for the manufacture of distribution transformers in Western Canada. This latest step in decentralisation of manufacturing facilities, officials stated, was made to serve the needs of progressive western public utilities encouraging increased use of electricity in homes and on farms.

Power Export

It is reported from Sweden that plans are being made to import hydro-electric power from the Trondheim area of Norway. A contract has, in fact, been signed between the Stockholm and Trondheim Municipal Councils providing for the supply of about 300 million units annually to Stockholm. According to the plan, the power transmission scheme may operate in 1958, when the proposed scheme for hydro-electric development in the neighbourhood of Trondheim is complete.

Swiss Market

Competition on the Swiss market for electrical household appliances is becoming keener, it is reported. Manufacturers and dealers are trying to attract more business; the former by bringing out new models and the latter by extending the hire-purchase system. Furthermore, substantial price cuts have been made in some cases. The chief items on which sales conditions are toughest are stated to be vacuum cleaners, electric mixers, razors and washing machines. There are about 80 models of washing machines alone on the market. Under these conditions, retailers are trying to meet customers' requirements by stocking only those models for which well-developed service and repair organisations are available. Many foreign firms are operating on the market alongside Swiss manufacturers, offerings from the U.S., Britain, and Western Germany being particularly heavy.

A Completed Dam

From Austria comes news that the dam of the Tauernmoosee, claimed to be the highest in the country, has been completed. These works at the Weisssee dam, which is situated at 2,300 m above sea level, were particularly difficult, it seems. The 15,000 tons of cement needed were conveyed by ropeway to a suspended stage and from there distributed by tubes to the walls of the dam. The new lake, which has a usable capacity of 21 million cu m, supplies three existing railway power stations in the Stubach Valley, called Enzingerboden, Scheideran and Uttendorf; each utilising the water in turn. The additional water now available means that these three power stations will be able to generate a total of 230 million units annually, of which 100 million will be during the winter months.

Atom Power for Holland?

Dutch atomic scientists are seeking funds from industry and the Government to set up an atomic power breeder, Dr. W. J. Beekman, Director of the Netherlands Foundation for Fundamental Research has disclosed. A contract is expected to be signed shortly with leading Dutch electricity companies who would contribute 125,000 guilders per year for a period of five years and make available laboratories and services. Dr. Beekman added that some leading industries were prepared in principle to contribute similar amounts to the project.

Blackout in Khartoum

An unfortunate accident at Khartoum power station has caused serious damage to the generator, as the result of which it has been necessary to enforce load-shedding at Khartoum, Omdurman and Khartoum North. The Sudan Light and Power Co. has stated that no improvement in the position is likely until about the middle of February, when the new generating plant, which is in course of erection, is expected to be in commission. In the meantime it has been necessary to ban shop window lighting and illuminated advertising signs.

Slight Relief in Jerusalem

Jerusalem, long afflicted by blackouts, is hoping for some alleviation when a supply becomes available from the Shimson Cement Works at Hartub. At that works, employees were on strike for more than a fortnight, and there were suggestions that the Government should take over the plant. But the men have returned to work and last month all efforts were being made to get the plant operating to supply about 2,700 kW to the city. This amount will be increased by an additional supply from the Palestine Electric Corporation Ltd., which is erecting a new h.t. line from the coastal region. The Jerusalem undertaking is in urgent need of spare parts, overhaul of the power station having been postponed for two years, and now a number of the 11 generators are out of service, it is reported. About three months ago the Government allocated £28,000 for purchasing part of the replacements required and a further £67,000 was later earmarked for a similar purpose. In the meantime the electricity service in Jerusalem is the worst since the siege, it is stated.

Protection Extended

The Government of India has passed the Indian Tariff (4th Amendment) Bill, 1952, under which the period of certain protective duties has been extended. For electrolytic copper rods, aluminium, wire and cables, electrical accessories made of plastics, and dry batteries, the date of protection has been extended to December 31, 1953, and for batteries (and plates) for motor vehicles, to December 31, 1955.

Delhi's New Station

A new power station with a capacity of about 20,000 kW was opened in Delhi last month by the Union Minister for Irrigation and Power, Mr. G. L. Nanda. The project took four years to complete and cost more than Rs. 20 million. Delhi is expected to get about 20,000 kW of power from the Damodar Valley grid in 1953. Another 20,000 kW will be available at a later date.

Loans Wanted

The Damodar Valley Corporation, India, is seeking a second loan of 22 million dollars from the World Bank. The Chairman of the Corporation, Mr. S. N. Mazumdar, has left for Washington to negotiate the loan. He said, before leaving Bombay, that the work of the corporation was progressing according to schedule. The first World Bank loan for the D.V.C., amounting to 18 million dollars, was given in 1950.

Pakistan Import Rules

New rules are being framed by Pakistan under the Registration of Importers and Exporters Order (1952), we hear. In future, it seems, foreign firms of importers will not be able to do business in Pakistan unless they register in that country under the Companies Act and employ, on the same terms and conditions, as many Pakistan nationals in the superior grades as they employ nationals of their countries of origin. Further, such devices as "shadow firms" will not be permitted.

Silver Jubilee

We have now received a copy of the souvenir issued to commemorate the silver jubilee celebrations of the South Madras Electric Supply Corporation Ltd., which took place last September. The celebrations actually marked the 25th anniversary of the first supply of current by the parent company, the Trichinopoly-Srirangam Electric Supply Corporation Ltd., the concern which was merged with two others in 1940 to form the present company. The brochure records that the Trichy company started with two 150 h.p. engines to serve only 40 consumers, but after adding to the plant the company ceased to generate its own electricity in June, 1935, and began purchasing from the Government Hydro-electric Department. The undertaking now operates in an area of over 12,000 square miles, and supplies about 40,000 consumers. Units sold annually amount to over 72 millions—indicating that the Presidency, which may have been backward electrically 25 years ago, has since made rapid strides in development under the enlightened and progressive management of the Trichy company.

Snowy Mountains Progress

Up to the end of the third year of construction work on the Snowy Mountains hydro-electric and irrigation projects, a total of £19,000,000 had been expended. That figure is made up of £2,500,000 in the first year, £6,250,000 in the second year, and £10,250,000 in the third year ended August 1 last, the report of the Snowy Mountains Hydro-Electric Authority shows. Progress to date on the Guthega project on the Upper Snowy River is well up to schedule. Here work is expected to be completed in 1954 when two English Electric 30 MW turbo-generators on order will be installed. There is provision, too, for a third set when required. In addition to the Guthega scheme, the immediate programme provides for the construction of the Adaminaby-Tumut Pond project, involving a 15-mile tunnel, a high dam on the Upper Tumut River from which a 4-mile tunnel will run to a large power station, together with the erection of the associated h.t. transmission lines. At the same time, the New South Wales Public Works Dept. is proceeding with the construction of the Adaminaby dam—one of the largest earth dams in the world.

Copper Smelting

The first copper smelter in Central Australia is expected to be completed very shortly, thereby providing a valuable development in the area which is claimed to be one of the richest in the world. The smelter is being constructed at a mine called Home of Bullion, some 180 miles north of Alice Springs. The copper ore mined is of low grade and up to the present has had to be transported south for treatment. Because of the high charges involved ores must contain not less than 15% copper. It is now considered that with the new smelter operating it will be possible to produce concentrates of about 40% copper.

A Start on Trevallyn

The first concrete was poured a few days ago at the Trevallyn dam of the Hydro-Electric Commission of Tasmania. The dam, which is situated on the South Esk, will be about 75 ft high when finished. The project will supply electricity for the aluminium works at Bell Bay on the Tamar.

H.E. Project

The ground-breaking ceremony for the Kamishiiba Dam in Miyazaki Prefecture by the Kyushu Electric Power Co. took place recently. The dam, the first arch-style one to be built in Japan, is to be completed in 1953 at a cost of 10,300,000,000 yen. It will have a generating capacity of 90,000 kW.

PERSONALITIES

IN THE INDUSTRY

For the post of deputy station superintendent at Skelton Grange power station, the Yorkshire Division, B.E.A., has selected **Mr. G. T. Shepherd,** B.Sc.(Eng.), A.M.I.Mech.E., A.M.I.E.E., we learn. Mr. Shepherd, who is boiler house superintendent at Kirkstall power station, has already served at Skelton Grange for he became a shift charge engineer there when it was commissioned and later held the position of electrical maintenance engineer until going to Kirkstall as boiler house superintendent earlier this year.

Mr. G. T. Shepherd

Educated at King Edward VI School, Birmingham, he served an apprenticeship with the General Electric Co. at Witton. After a graduate traineeship with the City of Birmingham Electric Supply Department he held positions at Hams Hall 'B' and Portishead power station and afterwards was appointed shift charge engineer at Kirkstall.

Prior to the recent meeting of the South Eastern Consultative Council, **Mr. M. A. Bulloch,** A.M.I.E.E., was presented with a chiming clock by the members in appreciation of his four years' chairmanship, which he has resigned because of ill health.

Mr. F. C. Barford, T.D., M.I.E.E., M.A.Min.E.M.E., who was manager of the Newcastle-on-Tyne district office of the British Thomson-Houston Co. Ltd., has been appointed manager of the firm's Manchester district office in succession to **Mr. A. B. Race,** who is retiring after 22 years in that position. Mr. Barford received his early general education at Lawrence Sheriff School, Rugby, and served an engineering student apprenticeship with B.T.H., while attending the Rugby College of Technology and Arts. After a time in the Industrial Sales Dept., Rugby, he was posted to the power engineering staff of Glasgow district office. During the war he held the position of Commander, R.E.M.E., and also assistant director of mechanical engineering in anti-aircraft formations in this country. On his release from the Forces in 1945, he rejoined B.T.H.—on the power engineering staff of Manchester district office. The following year he went to Newcastle district office as deputy manager, and in June, 1947, was appointed manager. As already announced, Mr. Barford is succeeded at Newcastle by **Mr. S. J. Clarke,** T.D., who was until recently manager of the company's Swansea district office.

Mr. F. C. Barford

Area Board Chairmen and Deputy Chairmen:

The Minister of Fuel and Power has made the following appointments and re-appointments of chairmen and deputy chairmen of the Electricity Boards:—

London: Chairman: H. J. Randall, C.B.E. Deputy Chairman: E. A. Mills.

South Eastern: Chairman: N. Elliott, O.B.E. Deputy Chairman: W. R. T. Skinner.

Southern: Chairman: H. Nimmo. Deputy Chairman: R. R. B. Brown.

South Western: Chairman: S. F. Steward, C.B.E. Deputy Chairman: H. Midgley.

Eastern: Chairman: C. T. Melling. Deputy Chairman: H. C. Waters, J.P.

East Midlands: Chairman: C. R. King. Deputy Chairman: J. Mould.

Midlands: Chairman: Ald. W. S. Lewis, C.B.E., J.P. Deputy Chairman: D. H. Kendon.

South Wales: Chairman: L. Howles, C.B.E. *Deputy Chairman: W. A. Gallon.

Merseyside and N. Wales: Chairman: J. Eccles, C.B.E., M.M. *Deputy Chairman: J. Rankin, O.B.E.

North Eastern: Chairman: H. H. Mullens. Deputy Chairman: T. E. Daniel.

North Western: Chairman: Sir Joseph Hallsworth. Deputy Chairman: R. A. S. Thwaites.

S.E. Scotland: Chairman: Sir Norman Duke, K.B.E., C.B., D.S.O., M.C. Deputy Chairman: W. S. Sawtell.

S.W. Scotland: Chairman: J. S. Pickles, J.P. Deputy Chairman: W. Hutton.

The Ministry has refused to divulge the operative periods of these appointments, but we understand they vary from one to five years.

* **New appointments.**—Note Mr. D. P. Oliver, deputy chairman, Merseyside and N. Wales Board, and Mr. E. Jones, deputy chairman, S. Wales Board, have retired on completion of their terms of office.

Mr. W. A. Gallon

Mr. James Rankin

Mr. W. A. Gallon, B.SC., M.I.E.E., F.R.ECON.S., the new deputy chairman of the South Wales Electricity Board, has been controller of the Merseyside and North Wales Division since February 1952. Earlier he was engineer-in-chief to the South Eastern Electricity Board. He has had extensive experience in the Supply Industry, first at Newcastle-upon-Tyne, then at Plymouth and Southampton, prior to becoming borough electrical engineer at Woolwich in 1941. **Mr. James Rankin,** O.B.E., F.C.I.S., COMP.I.E.E., who has become deputy chairman of the Merseyside and North Wales Electricity Board, has been secretary to that Board. He has long associations with the Supply Industry in North Wales, joining the former North Wales Power Co. in 1918. He became its secretary in 1929 on the formation of the British Power and Light Corporation Ltd., of which he was also secretary. In 1940 he became director and general manager of the North Wales Power Co. and Electricity Distribution of North Wales and District Ltd.

The court of the University of Durham has appointed **Dr. W. S. Patterson,** D.SC., PH.D., M.SC., at present lecturer in fuel technology at Newcastle, to a Personal Readership in Fuel Science at Newcastle.

Dundee Transport Committee has recommended that **Mr. W. L. Russell,** divisional engineer, Midland Division, Road Haulage Executive, be appointed engineer and manager of the Corporation Transport Department.

To two branch managers of British Insulated Callender's Cables, Ltd., **Mr. R. S. Gough,** Bristol, and **Mr. T. R. Thomas,** Cardiff, who are retiring, an informal luncheon was given at the Waldorf Hotel, recently, at which **Mr. H. J. Stone,** director and deputy chief executive, presented each of them with a cheque subscribed by their colleagues. Mr. Gough, who has been branch manager at Bristol since the formation of B.I.C.C. in 1945, was articled to R. Alger and Sons, Newport, and on completion of this training, joined the construction department of the Yorkshire Electric Power Co. Among the many contracts with which he was closely associated was the interconnecting of that company's electrical system with the systems of Bradford and Sheffield. In 1923 he was appointed resident engineer at the Bristol branch of the General Electric Co. and 13 years later joined the former British Insulated Cables, Ltd., as sub-branch manager at Bristol. Mr. Thomas received his practical training in the electrical department of D. Davis and Sons, Ltd. (colliery proprietors) and was eventually appointed assistant electrical engineer. In 1919 he became chief electrical engineer to the Main Colliery Co., Ltd., Glamorgan, and four years later joined the former British Insulated Cables, Ltd., as a technical assistant at their Cardiff office. He was appointed branch manager in 1936. Mr. Thomas was president of the South Wales branch of the Association of Mining Electrical and Mechanical Engineers for the 1945 session.

Mr. T. Stockwell, M.I.E.E., has been appointed generation engineer (operation) of the No. 2 sub-division of the North Western Division of the B.E.A., and succeeds Mr. Ridings who recently retired. He received early training with Richardsons, Westgarth and Co., and the B.T.H. Co., and joined the Electricity Department of the Rawtenstall Corporation as a shift charge engineer in 1927. With that undertaking he held various posts, eventually becoming borough electrical engineer in 1945. At vesting day he was executive officer of the authority at Bacup and Rawtenstall, and in August, 1948, was appointed senior assistant engineer (electrical) in the No. 2 sub-division. During Mr. Riding's recent illness, Mr. Stockwell has also been acting generation engineer.

Mr. T. Stockwell

Mr. H. J. Stone presenting cheques to Mr. Gough (left) and Mr. Thomas (right)

Mr. Cole (second from left) and Mr. Robertson (right foreground) with recipients of awards

The foremen of E. K. Cole, Ltd., held their annual dinner recently, at which **Mr. E. K. Cole**, chairman of the company and **Mr. N. C. Robertson**, deputy managing director, and other directors, attended as guests. After the dinner Mr. Cole presented gold watches to **Mr. J. Baxendale**, foreman in the service department, **Mr. S. G. Lee**, chief clerk, transport and despatch department, and **Mr. T. W. Dudley**, foreman in the radio division, all of whom have recently completed 25 years service with the company.

Mr. W. H. Metcalfe, M.I.E.E., who has served at Pontefract, Bacup and Morley for many years, has been appointed manager of the Rotherham and Mexborough district of the Yorkshire Electricity Board. Prior to vesting day he was chief engineer and manager to Morley Corporation.

As from January 1, 1953, **Sir Ernest Canning**, D.L., J.P., has relinquished the position of joint managing director of W. Canning and Co. Ltd., but continues as chairman of the board of directors. **Mr. G. A. Pope** continues as joint managing director and has been appointed deputy chairman. **Mr. F. H. Ewers** (financial director) has been appointed joint managing director. Four additional directors—all prominent executives who have been with the company for many years—have been appointed. They are **Mr. E. G. Catton, Mr. H. C. Clements, Mr. S. S. Dawson** and **Mr. E. L. Masek**. At a gathering recently, Sir Ernest Canning, who joined the company 60 years ago, said he will sail for South America on February 7 to study the company's markets there.

Mr. Neil S. Beaton has been reappointed a part-time member of the North of Scotland Hydro-Electric Board for a further year from January 1, 1953.

To broaden the basis of the company, a new board of directors has been appointed for R. H. Windsor Ltd., of Chessington. **Mr. R. E. G. Windsor**, son of the late R. H. Windsor, who founded the business, remains managing director. The chairman is **Mr. A. G. Dennis**, LL.M., and the two other new members of the board are **Mr. H. V. Yorke** and **Mr. C. N. Baker**, F.C.A.

Mr. B. C. Westall has resigned the managing directorship of Thomas De La Rue and Co., with effect from January, in order to make way for a younger man. He has, however, agreed to continue, at the board's suggestion, as chairman of the company. **Mr. A. G. Norman** has been appointed managing director.

His many friends will be glad to hear that **Mr. H. Nimmo**, chairman, Southern Electricity Board, who has been ill in a London hospital, has left for his home in Essex where he will convalesce.

At present operation superintendent at Poole generating station, **Mr. E. H. Boyce**, A.M.I.E.E., A.M.I.Mech.E., has been appointed deputy station superintendent at Kirkstall power station, Yorkshire Division, B.E.A. Mr. Boyce was educated at Riley High School, Hull, and Hull Technical College, and served an apprenticeship with Hull Corporation Electricity Department. During the war he served in the Navy, attaining the rank of Lieutenant (Electrical) R.N.V.R., and afterwards rejoined Hull Corporation. In 1947, he was appointed to the Meaford generating station where he became shift charge engineer, but left in 1950 to take up a similar post at Poole. He was promoted to operation superintendent in 1951.

Mr. W. Hartley retired from the board of Drake and Gorham (Contractors), Ltd., yesterday.

Power station superintendent at Ayresome and Horden generating stations, North Eastern Division, B.E.A., **Mr. H. W. Smith** was recently the recipient of a presentation by Mr. J. C. Mitchell, divisional controller, on his retirement. Mr. Smith is succeeded by **Mr. R. Stout**.

Mr. E. Jones, M.I.E.E., M.I.Mech.E., who, as we note on page 22, has retired from the position of deputy chairman of the South Wales Electricity Board, having completed his term of office, was city electrical engineer and manager at Cardiff from 1935 till 1948. He actually joined that undertaking in 1913 as deputy mains superintendent after several years' experience in marine and colliery work.

Mr. Edward Jones

At present shift engineer at Stoke-on-Trent generating station, **Mr. H. Green** has been appointed engineer-in-charge at Kingston "B" power station, South Eastern Division, B.E.A.

We hear from Thorn Electrical Industries, Ltd., that **Mr. A. P. Ross** has joined that company and will be mainly concerned with the sale of special products and technical components. He was previously with Belling and Lee, Ltd.

Mr. A. P. Ross

Cable and Wireless (Holding), Ltd., announce that **Sir John Wardlaw-Milne** left the company's board at the end of the year and that he has been appointed honorary vice-president from January 1, 1953.

OBITUARY

Mr. J. Pinder, R.N. (Retd.), A.M.I.E.E., who was one of the chief outside engineers with the J. L. Eve Construction Co., Ltd., died on December 18, aged 60. He had been with that company since its formation in 1930. Previously he was with the Foundation Co., Ltd. Until quite recently he was working on the completion of the Poplar-Brimsdown 132 kV line for the B.E.A.

Mr. A. Holman, managing director of Holman and Co. (Engineers), Ltd., died on December 25, aged 70.

Mr. G. A. Lister, A.M.I.E.E., who died on December 19, aged 73, was at one time a lecturer in electrical engineering at the University of Birmingham, and in 1911 with the late Dr. D. K. Morris, founded the firm of Morris and Lister, electrical engineers, at Coventry. That concern changed its title to the M.L. Magneto Syndicate and in 1930 was acquired by Joseph Lucas, Ltd., in which organisation Mr. Lister held various positions until retiring in 1945.

Mr. W. T. Gibson, O.B.E., M.A., B.SC., M.I.E.E., chief valve engineer to Standard Telephones and Cables, Ltd., died on December 27, aged 53.

Mr. E. B. Uttley, M.I.Mech.E., M.I.E.E., who died at Bognor Regis on December 27, aged 78, was chief constructor and electric inspector to the Rhodesian Government for many years.

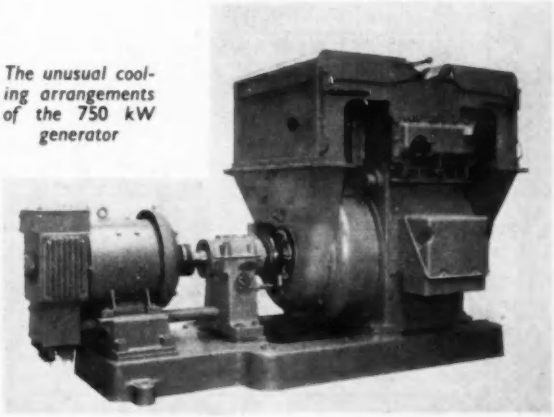
Mr. J. Soulsby, who has died aged 80, was formerly electrical engineer at South Medomsley Colliery, Co. Durham.

COOLING IN THE TROPICS

TROPICAL climatic conditions pose many problems for designers of electrical equipment, especially in the arrangements for cooling. When these problems are complicated by those of site and working conditions, unusual methods for their solution are called for. How unusual is demonstrated by the 750 kW turbo-alternator supplied to Sena Sugar Estates, Ltd., by the General Electric Co. Ltd. The machine is to be installed at Luabo in Portuguese East Africa, where the ambient temperature averages from 90° to 100° F for most of the year with midday peaks at certain seasons of 110° to 114° F. As the site itself was prone to flooding and the atmosphere, under working conditions, laden with bagasse dust from the crushed sugar, cooling this machine demanded an unconventional approach.

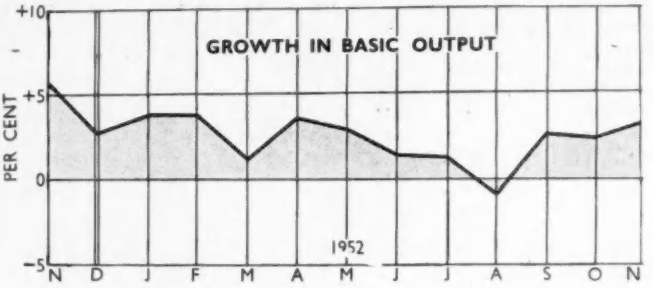
Using closed circuit ventilation to prevent the ingress of bagasse dust, the cooling equipment has been mounted above the alternator, as shown in the illustration, thus overcoming risks from flooding. In this reversal of normal practice, cooling is by air drawn over tubes of water to entract the heat and then through the alternator by fans mounted at each end of the rotor. Should these requirements prove inadequate, during extremely high ambient temperature conditions, extra air can be drawn in from the atmosphere through dampers which open automatically. Vents in the exhaust ducts provide means by which this excess air is ejected from the system.

The unusual cooling arrangements of the 750 kW generator



BASIC LOAD GROWTH

The accompanying curve shows how the energy sold by the B.E.A. in the past 12 months has compared with that of the corresponding month a year earlier. The figures used for plotting are first corrected for the effects of temperature and for the number of working days included in the calendar month. Thus the points marked are an approximate measure of the basic rate of load growth being experienced by the B.E.A.



Power Supply in November

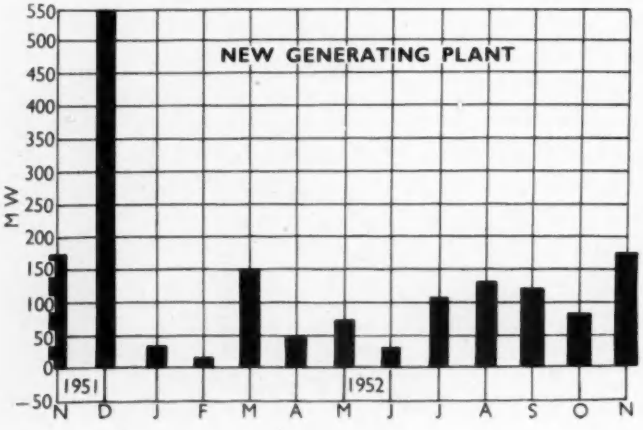
NOVEMBER was notable for the first lengthy run of extremely cold weather that the electricity supply industry has had to face since December, 1950. Average temperatures during the month were 48·3° F, 43·2, 39·6, and 36·1 (for weeks ending 7th, 14th, etc.) and 36·0 for that ending December 5. Demand showed an immediate response, and from a national level of 1,150 m. units s.o. weekly the energy transmitted from stations rose to 1,400 m. units.

Plant and Load

Although maximum demand figures are not available at the time of writing this article, it is interesting to compare the 1950 and 1952 figures on a units/kW installed basis. For the second week in December, 1950, this works out at 83·5 kWh/kW; for the last week in November, 1952, 80·5 kWh/kW. In comparing these figures, it has to be recalled that load shedding during the earlier period was heavier than for the more recent week. The drop in the ratio is thus some measure of the effects of the improvement in the plant position.

For the B.E.A. the increase in sales over the milder November of 1951 was striking. Total sales showed an increase of 8·1%, yet after adjusting to hypothetical "normal weather and standard working days," this increase falls to 3·3%. For the twelve months ending November 30, in comparison with the previous twelve months, the increase on this basis is 2·6%, whereas last November this figure stood at 9·8%.

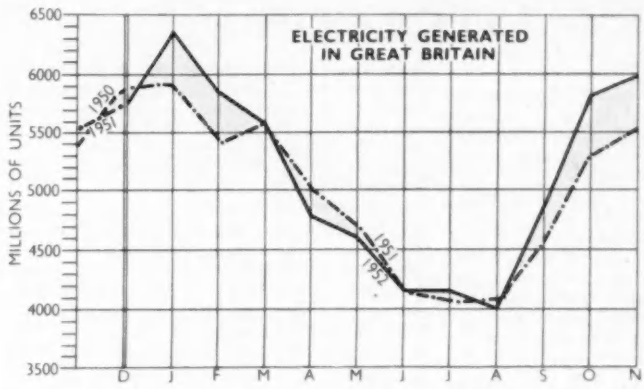
When boards having a principally (greater than 50%) industrial demand are compared with those having a predominantly domestic



GENERATING PLANT

At the end of November, 1952, the installed capacity of the B.E.A. was 16,607 MW, showing an increase of 172 MW during the month. During this same period the North of Scotland total remained constant at 643 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,473 MW, or 9·3% of the total at the end of November, 1951.

The total installed capacity used for the purposes of this graph is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.



UNITS GENERATED

5,982 million units was the total generated during November in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 5,489 million units.

Of the total, 5,788 million units was generated in steam stations and 180 million units in hydro-electric.

Energy sent out during the month was 5,646 million units, 94·4% of that generated. This gives the total for the year so far as 52,607 million units, showing an increase of 2·9% on the same period of 1951.

demand, the increase on November, 1951, is found to be 5·3% for the former and 13·2% for the latter. There are eight and six boards in each group respectively.

November commissioning on the B.E.A. system increased the installed capacity at four stations. In the London Division, a third boiler was brought into operation at Brunswick Wharf. This was a 320 klb/hr Clarke Chapman unit. At Scunthorpe, in the Yorkshire Division, a 60 MW Parsons set was commissioned, and with it a 550 klb/hr boiler by Stirling. This makes the second combination to come into operation at this station.

B.E.A. SALES TO AREA BOARDS IN NOVEMBER

Board	Nov. total in million units	% in. or dec. on Nov. 1951
London	546·6	+11·1
South Eastern ...	313·1	+15·0
Southern	362·7	+14·3
South Western ...	172·3	+14·0
Eastern	507·6	+14·9
East Midlands ...	422·6	+10·2
Midlands	569·3	+7·6
South Wales	286·0	+3·1
Merseyside and N.W.	306·5	−0·9
Yorkshire	543·1	+8·9
North Eastern ...	320·5	+2·4
North Western ...	592·2	+1·0
S.E. Scotland ...	117·7	+7·3
S.W. Scotland ...	293·2	+8·9
Direct Sales	64·8	+8·4
Grand Total ...	5,418·2	+8·1

Midlands Commissioning

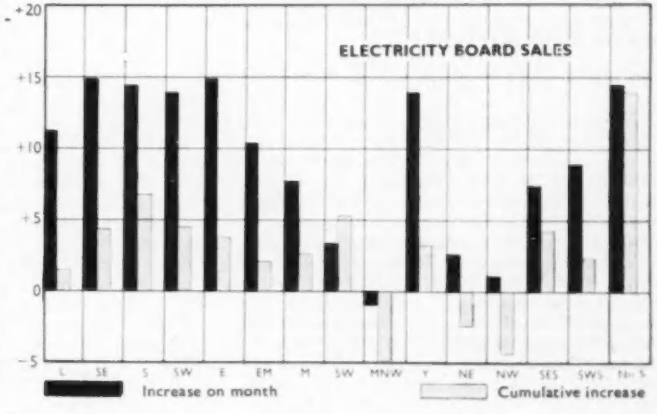
In the Midlands Division, a third set came on the bars at Nechells B, making a total of three 52·5 MW Parsons units in operation at this station. Finally, in the East Midlands Division, there is a 175 klb/hr boiler to record in connection with extensions at Northampton.

On a basis of increased "sent out" capacity, the year's commissionings up to the end of November represent just 1,000 MW increase in the B.E.A.'s capacity. This figure takes into account boiler plant as well as turbo alternators.

NOVEMBER SALES

Progress in the sales of energy by the British Electricity area boards and by the "North of Scotland" (N. of S. H.E. Board and Lochaber Power Co. together) are represented in the accompanying diagram. The two columns for each entry indicate, respectively, the bulk supply of electricity (or the total generation, for the North of Scotland) taken in November, 1952, as a percentage increase on the corresponding 1951 figure; and the same comparison for the cumulative totals based on the financial year.

It should be noted that the B.E.A. financial year runs from April 1, while that of the North of Scotland has been taken to correspond with the calendar year.



NEW LITERATURE

The Exporter's Year Book

THERE is little modification in the form of presentation adopted in this 1953 edition. Again, it includes valuable information of interest to all exporters on matters such as commercial invoices and certificates of origin required by the various countries. After the section covering Gt. Britain, every country in the world is dealt with in turn, data being given on currency, postal information, etc. This is followed by a diary section and numerous weights and measures tables. In all, it provides a ready reference to most matters of interest in the export trade. *Syren and Shipping*, 378 pages, 9¾ in. by 7 in. Price 40s.

World Railways

Edited by Henry Sampson

RAILWAYS have a powerful and, it appears, eternal fascination for the man in the street. When, in 1951, the first edition of "World Railways" was published, it seemed probable that with such a large and costly book, revisions and further editions would only be needed at intervals of several years. Yet so great proved the demand, so extensive was the influx of information to the publishers from all quarters of the globe, and so rapidly is railway development going ahead, that it was found requisite to publish a second edition.

Substantially, the layout and arrangement is the same although many more details have been included, particularly with reference to system organisation and layout. Again, as in the previous issue, little information has been received directly from behind the Iron Curtain, although some knowledge has been gained from reliable sources.

Electrification and "dieselisation" occupy a considerably larger amount of text than in 1951 indicating the general trend of railway operation all over the world.

For the railway engineer, this should be a "must," as even a cursory perusal will stimulate the mind. For the amateur it will provide many hours of interesting browsing. Published by Sampson Low, Marston, and Co. Ltd., 550 pages, 8½ in. by 13 in. Price £4 4s.

Equivalent Circuits of Electrical Machines

by G. Kron

TENSORS are neither used nor discussed in the body of this book: that is the first point that must be made clear about this weighty volume from the famous pen of Gabriel Kron. In fact, all the circuits presented are developed by means of a unified physical picture, without any mathematical analysis. As is natural, however, the whole background is tensorial. To quote the author's preface, "the method of attack follows strictly the basic tensorial equations of electrodynamics, and the tensorial reasoning employed in their reduction to particular machines." It follows that the absence of mathematics does not belittle the importance of the more usual approach, and equally, that the study of this book is not a task to be undertaken lightly. Though its development is clearly carried out and presented, it is not easy reading; but for the earnest enquirer it offers considerable rewards. Published by Chapman and Hall, 278 pages, 9 in. by 6 in. Price 80s.

Energy Retrospect

by J. H. M. Sykes, ASSOCIATE I.E.E.

IT takes courage and a firm faith in one's own evaluation of affairs to set the scene of a story fifty years in the future and then pass judgment on today's events. That faith Mr. Sykes possesses, and so one quality that this discussion of today's fuel policy controversy as the historian of 1999 may see it is a firmness of approach which makes for easy reading. As a result, the arguments for the electrical case are readily assimilated by the reader, while his logical refutation of the claims made by protagonists of gas and solid fuel may be reinforced by the author's reading of the future. A book, in fact, that is worth reading for its stimulus to the imagination and its encouragement to criticism; but one that needs more than a pinch of salt to accompany its consumption. Published by Garraway, Ltd., 11a Church Street, London W.8, 46 pages, 8½ in. by 5¼ in. Price 6s. 6d.

BOOKS RECEIVED

Methods of Electrical Measurement, by C. T. Baldwin. Deals with theory and application of measurement circuits, but excludes instruments and meters. Degree standard. Published by Blackie & Son, 182 pages, 8½ in. by 6 in. Price 17s. 6d.

Worked Examples for Advanced Electrical Students, by D. I. Williams. Solutions to types of problem set in H.N.C. and I.E.E. Part 2 examinations. Published by E. and F. N. Spon, 160 pages, 8½ in. by 5½ in. Price 18s.

Efficiency in the Nationalised Industries. Papers by senior members of the Boards of nationalised industries, collected by the Institute of Public Relations. Published by Allen and Unwin, 65 pages, 8½ in. by 5½ in. Price 7s. 6d.

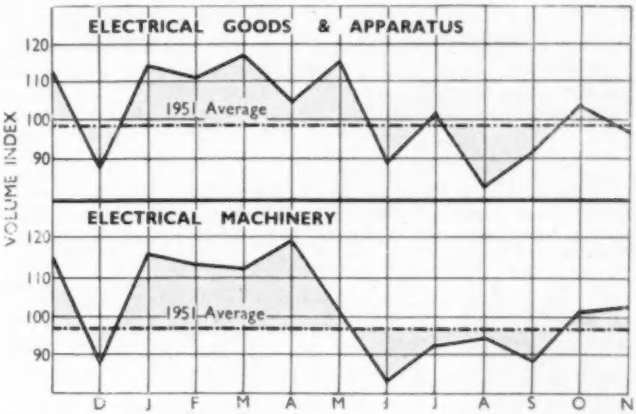
Welding of Ferrous Metals, ed. E. Fuchs and H. Bradley. Volume 2 of "Welding Practice," published by Butterworths Scientific Publications in association with Imperial Chemical Industries Ltd. 198 pages, 9¾ in. by 7 in. Price 22s. 6d.

Electric-wiring Diagrams, by W. Perren Maycock; revised by A. Serner. Diagrams and brief notes on operation. Published by Pitman, 156 pages, 7½ in. by 4¾ in. Fourth edition, 8s. 6d.

Lighting in Industry. No. 2 in the E.D.A. "Electricity and Productivity" series. Deals with lighting from the user's angle. Published by the Electrical Development Association, 2 Savoy Hill, W.C.2, 154 pages, 8¾ in. by 5½ in. Price 9s.

Electric Machinery, by A. E. Fitzgerald and C. Kingsley. Presents an integrated treatment of a.c. and d.c. machine theory for undergraduate students. Published by McGraw-Hill 702, pages, 9 in. by 6 in. Price 72s. 6d.

EXPORTS AND IMPORTS



EXPORTS VOLUME INDEX

Any valid assessment of the export of electrical equipment must be accompanied, from time to time, by changes in the year against which current exports are considered. Accordingly, the "Electrical Times" exports volume index is now based on the year 1950, instead of 1947 as hitherto.

On the new basis, the index for electrical goods and apparatus fell back from 103·5 to 97 during November. The index for electrical machinery, on the other hand, rose a little during the same month from 101 to 102·5. In value, exports of electrical goods and apparatus were £8,747,316 and of machinery £4,927,639.

THE value of all electrical goods exported during the month of November decreased slightly from the October figure, the reductions chiefly affecting consumer goods. But the serious setback which has affected electric cooking and heating appliances continues. In the November, 1952, figures, cooking appliances alone amounted to £86,520, against £309,656 in the same month of 1951, while that for irons was £77,725, only about £500 down on the previous year's figures. Complete electrical washing machines sent abroad last month amounted to £268,251 in value, some £50,000 lower than in October, while portable electric tools exported amounted to £113,504.

Description	Exports Value Month of November			Imports Value Month of November		
	1950	1951	1952	1950	1951	1952
Telegraph and Telephone Wires and Cables—	£	£	£	£	£	£
Submarine	52,400	25,296	—	—	—	—
Other	608,173	469,992	902,245	—	—	—
Rubber Insulated	426,548	807,520	431,746	—	—	—
Insulated, other than Rubber	779,023	1,045,008	1,327,617	—	—	—
Wireless Apparatus, including Valves	1,939,016	2,235,367	2,000,800	241,016	308,330	374,986
Telephone and Telegraph Apparatus	1,476,905	1,840,484	1,286,890	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	105,575	148,480	78,757	23,720	12,036	6,878
Other Descriptions	345,838	425,528	453,882	37,768	80,565	44,483
Batteries (primary)	177,065	242,177	178,504	—	—	—
Accumulators, Portable	274,153	341,193	263,163	—	—	—
,, Stationary	17,077	41,537	56,095	—	—	—
,, Parts and Accessories	81,126	78,889	85,816	—	—	—
Electrical Cooking and Heating Appliances	364,761	555,613	332,533	—	—	—
Ammeters, Voltmeters, etc., and Parts	143,004	155,947	154,413			
House Service Meters	99,312	153,409	86,969	40,275	56,648	36,156
All Other Instruments	131,407	113,551	159,591			
Electro-Medical Apparatus	57,904	51,013	50,917	—	—	—
X-Ray Apparatus, etc.	120,878	222,630	104,749	16,557	24,113	39,728
Insulating Materials	165,998	254,918	131,051	—	—	—
All Other Articles	383,331	706,155	571,578	96,542	137,965	122,462
Total of Group	7,749,494	9,877,707	8,747,316	455,878	619,657	624,693
Electrical Machinery:—						
Generating Sets (Diesel)* Not exceeding 200 kW	385,886	462,362	276,221			
,, ,, ,, Exceeding 200 kW	152,144	139,934	325,175	41,725	64,132	18,575
Other Generating Sets	465,253	122,518	114,569			
Generators minus Prime Movers and Parts†	283,132	386,792	617,160			
Motors	793,065	943,751	863,557	25,408	19,136	29,553
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,884,872	2,937,094	2,730,957	20,906	19,074	34,202
Fans, Electrically and Power Driven	107,913	194,005	232,726	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	376,859	635,216	360,795	—	—	—
Total Appliances and Machinery	12,198,618	15,699,379	14,268,476	543,917	721,999	707,023

* 1950 Figures include generators minus prime movers. † 1950 Figures for parts of generators only.

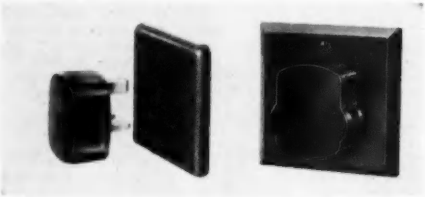
The BUYER'S *Column*

New 13 Amp. Accessories

A RANGE of electrical accessories for ring main wiring conforming to B.S. 1363 has been introduced by BILL SWITCHGEAR LTD., Aston Lane, Perry Barr, Birmingham 20.

The "Bill" range includes flush and surface type socket outlets, twin socket outlets of the flush pattern, switched socket outlets, flush type for a.c. supplies only, 13 amp fused plugs, both wood and metal conduit boxes and cartridge fuses.

The socket outlets, both flush and surface types,



These new 13 amp accessories are left, by Bill Switchgear and right, by T.M.C. Harwell (Sales)

comprise bases made from good vitreous porcelain with clear markings for e.l. and neutral, and covers from superior quality moulded Bakelite in brown, ivory or cream.

The switch socket incorporates a switch mounted on a vitreous china base which has a slow break action. The contacts are of pure silver; the accessory otherwise complies with the general design of the range.

In the plug the flat pins are detachable for easy wiring, whilst an effective cord grip lessens strain on the flexible. The plug is so designed that the ends of the flexible cable for connection can be cut off at equal length when wiring. It is normally fitted with a 13 amp fuse link, but 3 and 7 amp links are available and are interchangeable.

New accessories were also introduced by T.M.C. HARWELL (SALES) LTD., 37 Upper Berkeley Street, W.1. Their range of 13 amp flat pin fused plugs and sockets conforms to B.S. 1363. The Bakelite plate is said to be robust and large capacity wiring terminals are provided. The plug must be properly inserted otherwise the shutter will not operate. The plug takes any reasonable size flexible cable. A seamless drawn steel box with twelve knockouts is also available.

New "Morco" Pendant Fitting

A NEW less expensive 3-light pendant fitting is being marketed shortly by T. B. MORLEY AND CO., LTD., Jameson Street, Hull.

No. 9696, this fitting has a chromium-plated pendant and sells without shades at £2 2s., plus 22% tax. A wide range of shades suitable for the fitting are available from the manufacturers.

1953 Ace Radio

FIRST 1953 model to be produced by ACE RADIO, LTD., Tower Works, Tower Road, Willesden, London N.W.10, and due for general release this month is the "Minette."

This model, a 5-valve 3-waveband superheterodyne table receiver, has a 6½-in. elliptical loudspeaker, three controls, illuminated dial, sockets for extension loudspeaker and gramophone pick-up all housed in a French walnut and beech cabinet measuring only 17 in. wide, 12 in. high and 6½ in. deep.

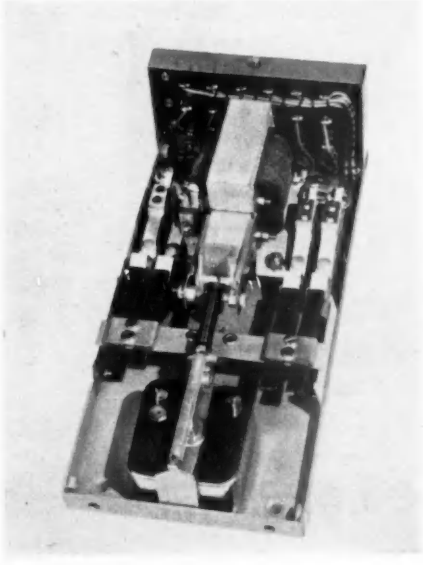
Reason for the reduction in size is said to be a need for a smaller portable receiver which will be complementary to the television set.

The "Minette", for 200-250 V a.c./d.c. supplies, covers frequencies 6-20 Mc/s, 545-1,580 kc/s, 156-333 kc/s and is priced 19 gns., tax paid.

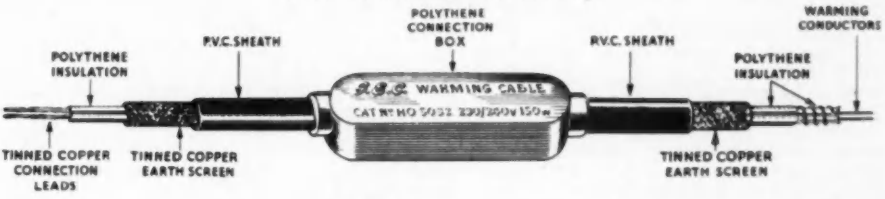
Dorman Fittings in Silicon Alloy

READERS' attention is drawn to the fact that the range of prismatic bulkhead fittings, made by DORMAN AND SMITH, LTD., Ordsal Electrical Works, Manchester 5, including the "Diolux," "Diolume" and "Diopal," are all of silicon alloy die-cast construction to Specification L.33. This, the firm says, makes them suitable for installation in saliferous atmospheres.

This is an illustration of Electro-Methods' relay which we described last week. We regret that the wrong unit was shown



G.E.C.'s new cable for soil warming



Cheaper Soil Warming

ELECTRIC soil warming has been made considerably cheaper with the development by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, of warming cables that can be used without a transformer. These cables consist of twin resistance wires insulated with plastic and sheathed throughout with a braided metal earth screen, the screen being protected with a plastic covering. The final 6 ft of the cable contains twin copper leads for connection to the electricity supply which are also plastic-insulated and protected with a braided metal earth screen. The earth screen which extends throughout the whole length of the cable and tail is not only a protection in the event of electrical failure, but is also a safeguard against damage by impact such as a blow by a spade. Cables for two loadings are available, one at 150 W, supplied in a 40 ft length, the other at 300 W, supplied in a 80 ft length. They are for use on 220/240 V a.c./d.c. supplies.

A Calendar Clock

NEWLY appointed sole distributors for Great Britain of the new Burk Calendar Clock are HADLEY SOUND EQUIPMENTS, LTD., of Smethwick, Staffs.

This calendar clock is suitable for large offices, agencies, etc.

In addition to recording the time, this clock also indicates day, date and month. Changes in the dates are made automatically and there is even provision for leap years without any adjustment.

The clock is housed in an oak case with an inlaid walnut front, and is fitted with brass fingers and hour blocks. The diameter of the face is 11 in., height 20 in., width 13 in., depth 4 in., with covered wall fixing. It can be supplied to operate from 110/250 V 50 c/s supply, or to serve as a slave-clock for 12 or 24 volt with master clock installations. The mechanism of the clock is independent of mains variations. Price of the clock is £35 plus £8 3s. 4d. tax.

Kelly's Visidial Fryer Cuts Costs

THE "Visidial" deep fat fryer marketed by JOHN KELLY AND SON, 71 George Street, Edinburgh, is a neat automatically operated unit which with its efficiency and smart appearance has been acclaimed by many large catering organisations.

Kelly's Visidial deep fat fryer

The makers claim several particular advantages for the "Visidial": That current consumption and consequently cost is greatly reduced. Fat savings of up to 50% are possible, there is no transfer of food flavours, that recovery times are fast, that its capacity of 10 lb chipped potatoes at one time and the perfect cooking will build repeat business and that smoke nuisance is practically eliminated.

The specification of this Eveready Visidial fat-fryer is given as follows: Large capacity one-piece cast-iron fry-pan, black porcelain enamelled and fully insulated. The flush-to-floor outer steel casing is sprayed in white synthetic finish with a toe base and access door. White porcelain enamelled front panel combining selection dial and knob. A light-fail picture panel with an indicating light for each element indicates when required temperatures have been reached. Separate fuses. The immersion heaters have flat anti-toxic bronze blades with high quality mica and Ni-chrome resistors. The thermostat has a stainless steel protection pocket and operates a contactor switch. The sediment trap has gate type control valve, whilst the cover is of sheet steel black stove enamelled.

The unit is for a.c. or d.c. supplies and is rated at 8 kW.

A.B. Kit Set Available

AN announcement by A. B. METAL PRODUCTS, 16 Berkeley Street, London W.1, says that their kit for the manufacture of prototype "H" switches is now available.

Housed in a handsome wooden cabinet, it contains all the necessary piece parts for the laboratory construction of prototype switches. All necessary assembly tools are included in the kit.

The WEEK in NEWS

Enquiry into Sales Agreements

Monopolies Commission receives New References

EXCLUSIVE dealing and collective boycott, matters which have been discussed by the Monopolies Commission in several of its reports, are now to form the subject of a special investigation by that body. This was announced by Mr. H. Strauss, Parliamentary Secretary to the Board of Trade shortly before Christmas. Explaining the reference, which is phrased in somewhat complicated terms, Mr. Strauss stated that the Commission was to report on practices which involved agreement between a number of traders to discriminate in favour of, or against, a defined class of customers.

Expanding this statement, the Monopolies Commission has given as examples of the type of arrangement concerned, the confinement of trade terms or wholesale terms to particular classes of persons; the withholding of supplies in accordance with a "stop" or "black" list; and rebates referring to aggregate purchases from a number of suppliers.

The Commission is inviting persons and organisations concerned with such practices to submit factual evidence and views upon them. Early indication of the intention to submit such evidence is requested, and it should be sent to the Commission at 3 Cornwall Terrace, Regent's Park, London N.W.1. Such notices should state briefly the basis of interest, and when evidence will be ready.

Agreements to which the only parties are a single buyer and a single seller, and those between members of a partnership or an interconnected group of companies are to be excluded.

Any action to give effect to any recommendations which the Commission may make, in the sense of certain practices being contrary to the public interest, would require new legislation. Under the section of the Act to which the Commission will be working, there is no power to enact general prohibition of a condemned type of practice.

MINISTRY ENDS ALUMINIUM CONTRACT

THE Ministry of Materials has stated that they are to discontinue the arrangement with the British Aluminium Co. whereby they buy the company's output of virgin aluminium for resale with imported metal. Most of the 30,000 tons of aluminium (approx.) produced annually by the firm is to be used in its own works, but others requiring metal for special purposes will continue to be supplied. Such sales will be licensed by the Ministry of Supply. The company will sell at prices not exceeding the Ministry's current prices for imported aluminium. The company's production and sales will be taken into account in the allocation scheme.

CASTLE BROMWICH FILLING UP FAST

HEARTENING news concerning preparations for the Coronation B.I.F. has been received from Birmingham, where the majority of electrical interests are centred. We hear there has been a record response to invitations from abroad and evidence of lower prices and quicker deliveries. The response is such, however, that latecomers may not be able to secure all the space they need. To date, 96% of all space indoors at Castle Bromwich has been sold, and bookings for the outdoor section are arriving constantly. It is estimated that when the Fair opens 1,200 firms in the heavier industrial sections will be exhibiting their latest goods.

METAL CONTROLS GO

UNWROUGHT brass and scrap of gilding metal, cupronickel and brass have been removed from price control under an order made by the Minister of Supply. Improved supplies have enabled this decision to be taken. The official announcement states that secondary copper and copper scrap remain subject to price control for the time being.

The First Half-Century

At present it seems that the final extinction of gas is still in the far future, though the gas man is beginning to be aware how serious is the competition of electric light to him. He may yet escape utter oblivion and serve to supply the fuel for the internal combustion engine, which so many engineers regard as the coming thing, perhaps even for the gas turbine of the future. At any rate, electrical engineers need not be troubled with nightmares, the prospects of our industry are more rosy than ever, especially since the legislature are beginning to realise the folly of regulations and actions 'in restraint of trade.'—*From our issue of January 1, 1903.*

New Midland Tariff to bring in Extra £1½m

INCREASES in the standard tariffs introduced in June, 1951, were announced by the Midlands Electricity Board shortly before Christmas. The alterations, briefly, involve an increase in the secondary unit charge of the Private Dwelling House tariff from ¾d. to ⅞d., an increase to the kVA and unit charge of the Industrial tariff, and consequential changes to other tariffs.

The rise of ¼d. in the domestic tariff applies only to the units used over 12 per room per quarter. The first step in the maximum demand part of large industrial consumers' tariff will go up to 7s. 6d. per kVA per month, with a corresponding increase of 9d. per kVA for larger demands; existing charges of ·55d. and ·50d. for each unit used will be increased by ·02d. to ·57d. and ·52d. As regards large commercial consumers, the second step is being raised to 8s. 6d. a month and the unit charge to ·62d. a unit. The present ⅞d. rate of combined premises tariff will also be raised to ⅞d. but the price of primary units will remain unaltered. No change is being made in the Farm Tariff.

These increases are designed to offset the rise in costs which have taken place so far during the current financial year, but are unlikely to allay the adverse balance expected next March which will have to be carried forward to the year 1953-54. They are estimated to bring in an extra £1,500,000. Increases become operative today (January 1) in most cases, but on April 1 for some large industrial and commercial users.

SULPHUR ALLOCATION FOR JAN. to MARCH

ALLOCATIONS of crude sulphur for the first quarter of this year have been made by the appropriate committee of the International Materials Conference. The quarterly total of 1,675,100 tons compares with the 3,200,260 tons during the latter half of 1952—the previous allocation period. Britain's share for the current quarter will be 83,000 tons, second only to the N. American continent, which shares 1,190,800 tons.

During the last six months, it is reported, there has been a substantial improvement in the supply position, due to increased production and a reduction in demand. The possibility of ending international allocations has been considered, but the improved position may only be temporary and a cessation of present arrangements consequently unwise.

Views Sought on Weights and Measures

A RECENT announcement by the President of the Board of Trade in the House of Commons stated that arrangements were being made for consultations about the recommendations of the Committee on Weights and Measures Legislation. Those concerned are traders, local authorities and others. These consultations are now beginning and the Board of Trade is inviting comments on any of the Committee's recommendations from any interested parties.

Those persons intending to submit comments should advise the Controller, Standards Dept., B.o.T., 26 Chapter St., S.W.1, as soon as possible, stating the recommendations on which they propose to give an opinion.

Legislation on the subject is not expected for some time due to the wide variety of recommendations made.

KENT FORM NEW CANADIAN CO.

A NEW company has been formed in Canada to take over the marketing of George Kent Ltd.'s industrial instruments, certain other products, and the Norlantic range of domestic and industrial water and steam meters. It will be known as Kent-Norlantic Ltd., and will be situated at Horner Avenue, Toronto 14. Arrangements are being made for the manufacture and assembly in Canada of some products, and for stocks to be held in Toronto. Kent-Norlantic is the latest subsidiary to be formed in connection with the parent company's activities, which include branches and subsidiaries in Malaya, South Africa and Australia. President of the new firm will be Mr. Kenneth R. Wells, previously manager of the Canadian branch of George Kent.

Fireguards in Ulster

THE Heating Appliances (Fireguards) Bill was given a second reading in the Ulster Senate just before Christmas. During the course of the debate it was proposed to submit on the committee stage an amendment altering the date on which the provisions of the Bill come into operation from April 1 to May 1. The extra month's grace is being sought to allow traders time to dispose of old stock.

Uncertain Market in Libya

WHILE small local or home industries meet the simple needs of the lower income groups of the population of Libya, all consumer goods of the medium and higher qualities have to be imported, as well as all machinery and equipment, reports the Overseas Economic Survey for Libya published recently. As regards imports, the majority of requirements have been met by shipments from the U.K.

Consumption of electricity in Libya is constantly increasing and can be expected to provide a steady demand for all kinds of basic electrical supplies for wiring, insulation and the like, states the Survey. Demand is, however, limited by the high cost of power, but refrigerators and all domestic appliances are imported and may even be said to form an appreciable part of the total imports of household equipment.

As for heavy electrical equipment, the prospects rest on the extent to which industry is established, and at present there is no early prospect of there being an appreciable market for that type of equipment.

COURSE ON DESIGN OF ELECTRICAL APPLIANCES

A RESIDENTIAL course on domestic electrical equipment will take place at Urchfont Manor, near Devizes, between March 9 and 13. It is being organised by the College for Adult Education in conjunction with the Council of Industrial Design and E.D.A., and is aimed primarily for those buying and selling lighting, heating, cooking and other equipment.

Among the lectures are two on design; one dealing with appearance and another on function; two on colour and lighting in the home; and one on the social influence of electricity. A display of well-designed electrical goods will be on view throughout the course and will be used by lecturers to illustrate their talks. Applications to attend should be addressed to the Warden, Urchfont Manor, Devizes, Wilts.

Radio and TV Exams.

THE Radio Trades Examination Board has announced the closing dates for entries and examination dates for 1953. Entries must be received for the Television Servicing Certificate exam by January 15, and the exam itself will be held on May 4 and 6, and on June 20. As regards the Radio Servicing Certificate examination, entries should be in by February 1 for the exams to take place on April 28 and 30, and May 16. Forms are obtainable from the R.T.E.B. Secretary at 9 Bedford Square, London W.C.1.

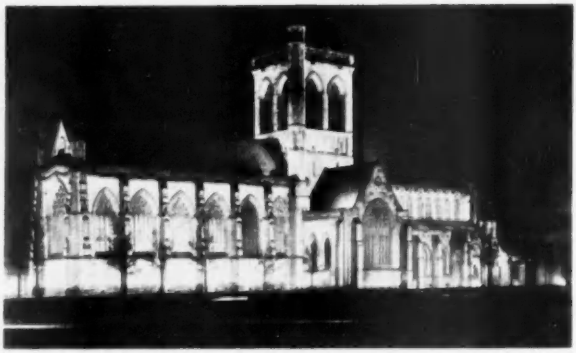
OFFICIAL PUBLICATIONS

RADIO AND TELECOMMUNICATIONS. *Final report on Census of Production for* 1948. H.M.S.O. 4s. 6d.

PRODUCTION AND INDUSTRIAL ENGINEERING IN U.S. AND CANADA. *Survey*, by D.S.I.R. H.M.S.O. 1s.

POST-WAR BUILDING STUDIES, No. 29. *Fire Grading of Buildings*. H.M.S.O. 4s. 6d.

PLANT MAINTENANCE. *Report of Anglo - American Productivity Team*. Obtainable from British Productivity Council, 2s. 6d. (see page 8).



A preview of what can be expected during the Coronation celebrations is provided by this admirable floodlight installation of Paisley Abbey. Twenty-nine Revo Electric (C.13106) floodlights were used in the scheme, carried out under the direction of Paisley's public lighting engineer, Mr. John Wilson

BOARD WANTS TO ADVERTISE

ALTHOUGH an increase in tariffs has been considered, the East Midlands Electricity Board has decided to take no immediate steps in that direction. Instead, the policy in that area is to increase sales and so reduce costs. It is expected that there will be a deficit of some £330,000 in the current financial year. It will be recalled that last April the Board's chairman, Mr. C. R. King, warned that the deficit was likely to be £980,000, but speaking recently, he said that rigid economies had cut that figure.

The chairman also said that they wanted to spend money to encourage the public to use more electricity outside peak hours and had asked the Minister of Fuel and Power to allow the resumption of publicity campaigns. At present the off-peak demand was well below generating capacity, he stated.

E.I.B.A. Appeal for Funds

A NUMBER of factors, including the rapid expansion of the electrical industry and the decrease in annual subscriptions, has led the present president of E.I.B.A., Col. B. H. Leeson, to make a further appeal for funds. While the number of hardship cases increases, the cost of living continues to rise, and taxation and death duties have caused a decline in legacies and donations.

As regards the E.I.B.A. we note also that the Northern Counties area is to hold its annual meeting at Carliol House, Newcastle, on January 15 at 3 p.m. The meeting will be under the chairmanship of Mr. J. C. Arkless.

Switchboard for New £60,000 Yacht

RECENTLY completed for an American tobacco magnate and owner of an air line is the yacht *Aries*, built at Gosport by Camper and Nicholsons, Ltd. She has taken about a year to build and cost well over £60,000. Air conditioning and fluorescent lighting are two of the yacht's special features, but of particular interest, too, is the marine switchboard, designed and manufactured for the craft by William McGeoch and Co., Ltd. This is self-contained and suitable for the control of two 20 kW compound-wound 220 V d.c. generators and incorporating means for battery charging. The switchboard is a dead front type with flush mounted square meters, back-of-board, double-pole circuits, breakers and H.R.C. type fuses.

Ministry asks about Street Lamp "Ring"

LOCAL authorities' associations are being asked by the Ministry of Transport to comment on an alleged price ring which is said to be covering certain street lighting equipment. A metropolitan borough has, it is understood, called attention to tenders received for the supply of lanterns. Eight firms apparently submitted tenders—the prices falling into two categories of £11 5s. 8d. for better quality equipment and £9 17s. 3d. for an inferior type. Particulars were submitted to the Ministry who, in consequence, sent a circular letter to the associations.

The letter states that E.L.F.A., on inquiry, had no reason to believe the prices were unreasonable. This reply was considered unsatisfactory, but the Association was willing to co-operate in any investigation. The matter might well be referred to the Monopolies Commission, had not that body already undertaken a full programme of work. As it was, it would be some time before the Commission could tackle the question, the letter states. Local authority associations have been asked to consider if any useful action could be taken in the matter.

LIGHTING IDEA FROM AMERICA

A NEW range of commercial-type fluorescent fittings of different lengths designed to provide an almost endless variety of lighting combinations to suit all shapes and sizes of offices, stores, schools and similar premises, has been marketed by Sylvania Electric Products Inc. of America. The fixtures are specially built for shallow ceiling areas, and are in lengths of between 2 ft and 8 ft for single mounting, and any length for continuous rows. This new recessed troffer line consists of one-, two- and three-lamp fixtures available with six different types of shielding and four incandescent spotlight fixtures.

Four types of glass shieldings provide the attractiveness of diffused lighting, and plastic shielding may be used where protection against breakage is required. Illustrated on this page are two applications of the new line—a square pattern for central lighting of large rooms, and a T-shaped pattern for joining transverse and lengthwise bands of lighting.

Campaign wanted to Denationalise Electricity

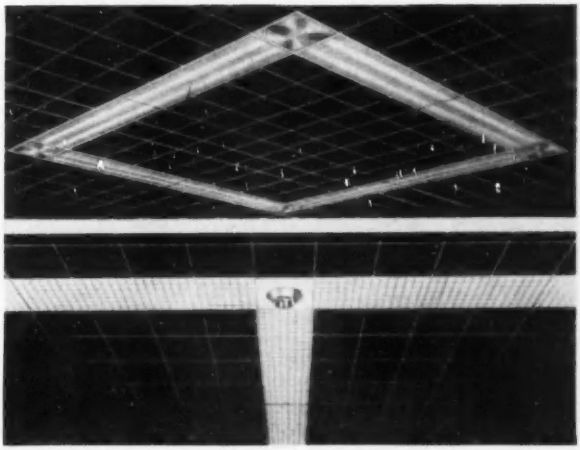
THERE have been one or two appeals by members of local authorities in recent months for the return of the electricity supply industry to municipal ownership. The latest request along these lines has been made to Hastings Council by the town's General Purposes Committee. The council is asked to start a campaign to give local authorities the responsibility for distribution of gas and electricity. As a preliminary step it is suggested that the approval of the Association of Municipal Corporations be sought. It is claimed by the sponsors that such an action would lead to the industry being operated to better advantage than by Boards who have no direct responsibility to consumers.

LARGE PLANT MOVED TO BIRMINGHAM

BECAUSE of a falling-off in the demand for fluorescent tubing, Chance Bros. have decided to transfer their plant for the manufacture of this material from the Firhill Works, Glasgow, to the company's main factory at Smethwick. There the tubes can be made in conjunction with other equipment and prove far more economical. The £250,000 plant was opened in January by the Secretary of State for Scotland and was scheduled to produce 15 million tubes a year—sufficient for both home and export demands. The decline in sales has been attributed to a decrease in demand from export markets and the Australian import restrictions.

Beama Catalogue

THE latest edition of *The BEAMA Catalogue* has received a deal of praise in the House of Commons, as a valuable contribution to securing export business. In reply to a question, the Secretary for Overseas Trade stated he would draw the attention of other industries to the way in which the catalogue had been produced—in the languages of countries in which it was hoped to sell goods.



Two applications of the Recessed Troffer Line recently announced by Sylvania Electric Products Inc. of America

CONFERENCE ON RURAL ELECTRIFICATION

RURAL electrification is still to the fore among those concerned with the electricity supply industry. Many are dissatisfied with the amount of progress being made, and most are anxious to see such development extended as far as is humanly possible. Concerned about the problem in Lincolnshire is Horncastle's M.P., Cdr. J. F. W. Maitland, who hopes a conference will be held at Spilsby early next year. Cdr. Maitland said recently that the E. Midlands Board chairman had agreed in principle to a conference of local authorities. He suggested that district and parish councils, the N.F.U. and similar bodies, and representatives of the Board should also attend. Information could then be exchanged on what had been done, what programme was envisaged for the future, and the difficulties involved.

I.E.E. Dinner Dance

WE hear that some tickets are still available for the I.E.E. Utilisation Section's 1953 dinner-dance. This event is to take place on January 13 at the Criterion Restaurant, Piccadilly, W.1, at 6.45 p.m. The tickets may be had from the Secretary at I.E.E. headquarters.

ECONOMICAL METHOD OF LAMP REPLACEMENT

THE replacement of all filament lamps in large installations, particularly street lighting schemes, has proved itself a means of saving considerable amounts of money in this country. The method of replacing lamps individually as they burnt out cost a great deal in terms of wages for maintenance engineers, so that it was found economical to scrap both burnt out and live lamps together and fix new lamps in all fittings at one time.

We now hear that a Boston, Massachusetts, insurance company has adopted the same method in connection with the fluorescent lighting scheme in their offices. The building comprises 36 floors and involves some 43,000 fluorescent tubes in 21,000 fittings. After a detailed study of the system over three years, guided by Sylvania Electric Products Ltd.'s engineers, through Dyer-Clark Co., the firm undertook the replacement programme. At the same time louvres and reflectors were washed and fittings overhauled. Twenty-two men completed the job in seven weeks.

DIAMOND JUBILEE

A NOTABLE dinner and dance took place in Birmingham recently at the Tyseley works of J. H. Tucker and Co., Ltd., when that company celebrated its diamond jubilee. Many past and present employees were entertained by the directors. Mr. J. B. Tucker, managing director and son of the founder, recalled the company's early days and looked forward to the centenary celebrations when, he said, Tucker switches might well be used for atomic power and electronic devices.

S.W. Board Connected 1,438 Farms Last Year

IN the 4½ years since nationalisation, 72% more farms in the S. Western Electricity Board's area had been supplied with electricity, the chairman, Mr. S. F. Steward, told the Consultative Council recently. A new record in rural development had been set up in the area during 1951-52, he said, 1,438 farms being connected in the year ending in September, compared with 1,174 during the previous 12 months. He warned however, that as time passed, the task became more difficult, farms and hamlets being more remote.

Mr. Steward went on to say, that compared with 1947, the Board had to find £750,000 more out of revenue annually to pay interest and depreciation on the mains, transformers, sub-stations and other capital assets. He said the present low average price of electricity had been maintained partly by improved efficiency, but mainly through increased sales.

Photograph taken during the annual trade cocktail party held by Ranton and Co., Ltd., for their friends. In the picture are Messrs. T. G. Brooke-Hitching, managing director of Ranton; P. T. Bishop of P. T. Bishop and Co.; F. Barnett, Wholesale Fittings; and F. E. Conradi, British Central Electrical Co.

More Christmas and New Year Greetings

OUR grateful acknowledgement of gifts and greetings in these columns last week was insufficient to cover all the calendars received. During the past week, calendars have also been received from the Lindley Thompson Transformer and Service Co. Ltd., Montgomerie Reid Engineering Co. Ltd., Electric Panels Ltd., and Mullard Ltd. We note particularly a calendar from the Netherlands, which is letterpress printed in eight colours in many instances.

REVIEWS OF TARIFFS

THE complaints over the principle of basing electricity tariffs on the number of rooms in a house have been answered by the Minister of Fuel and Power, following an inquiry by Mr. Gower, M.P. Mr. Lloyd has said that the workings of the new charges will be reviewed by the Boards when sufficient experience of their operation has been obtained. Consideration of any revision of those principles will depend on the results of those reviews.

Pollution of the Air

THE Fuel Research Station of D.S.I.R. is ready to give any assistance it could to local authorities requiring information on pollution of the air, Mr. Marples has stated in the House of Commons. A further inquiry had been addressed to him following the recent "great fog" in London, and the consequent discomfort. He reminded the House that arrangements had already been made to encourage the use of improved types of domestic appliances designed to burn smokeless fuel.

"MADE IN WALES"

THE Board of Trade has stated that traders themselves are responsible for the descriptions they apply to their commodities. There is no need to obtain permission to describe goods as "Made in Wales."

200 Broadcasts by B.I.C.C. Works Band

AN unusual achievement to be reported in these columns is the 200th broadcast of a band. The band concerned is that at the Erith works of British Insulated Callender's Cables, Ltd., formed originally at the end of the 19th century by the Salvation Army, but becoming an independent organisation shortly afterwards. As the majority of members were employed at the Erith works, it became the official works band in 1907. Its first broadcast was made in 1925.

Part of the Simplex Electric display which has been installed permanently at the new London Building Centre in Store Street

400 Cinemas will Show Washer Film

A DOZEN washing machines are being offered by H. Fisher (Oldham) Ltd., as prizes in a competition which will form part of a national publicity campaign during the early months of 1953. The Film Competition will include a short film about Fisher Washers in all A.B.C. cinemas. Stockists are invited to link up with the campaign.

Schoolboys on TV

FIFTEEN 10-minute quiz programmes on television every day are a special feature of the Schoolboys' Exhibition which opened yesterday at the New Horticultural Hall, Westminster. Subject of the quiz will be electricity related to the home, agriculture, industry and railways. The programmes can be viewed on the Electricity stand organised by E.D.A.

Power Units for Turkish Navy

A NEW marine auxiliary generating set has been designed and produced by A. C. Morrison (Engineers) Ltd., and eight have been supplied to the Turkish Navy as auxiliary power units for corvettes. One of the main features of these generating sets is their compactness. Output is 28·5 kW, 110 V d.c.

NEWS IN BRIEF

Two hundred employees of British Electric Lamps Ltd., Wimbledon, enjoyed their company's annual dinner recently.

It is reported from Iceland that following the dispute over fishing rights, Icelandic shopkeepers are refusing to display goods manufactured in Britain.

New premises were officially opened recently by the S.W. Electricity Board's chairman, Mr. S. F. Steward, for the Plymouth Social and Benevolent Club.

Employees of the Hackbridge Cable Co. who have completed 25 years' service with the firm attended the first social function, a dinner, of the Kelvin Works "25" Association. Membership numbers 106 to date.

Regular inspection and maintenance of electrical apparatus in factories, adoption of 110 V system for hand-held portable tools, and a 50 V or 25 V system for handlamps was urged by Mr. E. P. Tomblin, regional safety officer, B.E.A., recently.

One of the largest electric soil-warming and light irradiation plants has been switched on at Cleveleys, near Blackpool.

British Ropes, Ltd.'s 1952 B.I.F. stand has been awarded the silver cup presented by the Association of Display Producers for the best exhibition stand design last year.

Central Electricity Board of Malaya has placed an order for 58 generating sets with the National Gas and Oil Engine Co., Ltd. (members of Brush A.B.O.E. Group). Value of contract is £45,000.

In our article on Compression Cables in Canada on page 1,160 last week the estimated value of 26,000 ft of cable was incorrectly given as $15 million. This should, of course, have read $1·5 million.

As from December 30, buying prices of tungsten ores of standard 65% grade and ordinary quality will be, Wolframite 370s., and Scheelite 360s. per long ton units.

Electric Supply News . . .

Cornwall

During the recent floods at Penryn, in central Cornwall, Mr. E. Edmonds, Central Cornwall District Engineer, S.W. Electricity Board, and his staff played a valuable part in assisting the police, fire service and corporation workmen in winning the struggle against a river which was blocked and had overflowed its banks. Mr. Edmonds and his staff succeeded in keeping the water out of an underground 11 kV isolator which fed about 1,000 consumers and was at times only a few inches above the flood. They also provided floodlights to enable the work to go on at night and played a big part in the relief of the flooded St. Gluvias Road area by excavating a trench to drain off the water

Douglas (I.O.M.)

The Corporation Electricity Committee has decided that current consumed by floodlighting and decorative lighting installed for the Coronation celebrations (except neon and other signs) shall be charged for under the power tariff (2½d. per unit). This was agreed upon following receipt of a letter from the local Hotel and Boarding House Association asking for concessions. Some members protested that the reduction was not generous enough, but a proposal that the matter be referred back for reconsideration was rejected.

Eire

Bord na Mona's total production of machine turf and milled peat during the year ended March 31 last amounted to 525,138 tons, a big proportion of which was supplied to the Electric Supply Board for fuelling their Portarlington and Allenwood power stations, according to the Board's annual report. In this it is stated that at the request of the Minister for Industry and Commerce, the Board reported on bogs suitable for development to meet the E.S.B.'s programme for additional steam stations. It was decided that milled peat instead of sod peat would be used at the new electricity generating station which is to be erected near Ferbane, Offaly. The development of the Boora bogs was accordingly altered to meet the new situation. The price of turf of 30% moisture content to be supplied to the Portarlington power station from Clonsast during the year beginning September 1, 1951, was fixed at 49s. 1d. a ton, and from Timahoe and Blackrivet to the Allenwood station during the same period, at 56s. 2d.

Lochinver

At a ceremony at Lochinver to celebrate the township's linking with the supply of the North of Scotland Hydro-Electric Board from Ullapool, Mr. J. G. Grant, convener of Sutherland, said the Board was doing more for the development of the Highlands than any other body. Mr. Neil S. Beaton, a member of the Board, stated that a start would be made with the proposed £8,000,000 Loch Shin scheme some time in 1953 It would have been made sooner if the Board had received from other bodies the same co-operation which they had received from the county council. There were now 13,680 consumers of electricity in Sutherland, Caithness, and Ross and Cromarty, and 100 new consumers were being connected every month, he added.

Norham (Northumberland)

Norham and Islandshires Rural District Council have approved of a proposal by the South East Scotland Electricity Board for the erection of an overhead line from Scremerston Hill to Lowick, passing through Ancroft and Kyloe.

Oswestry

Fifty-three people have signed petitions to the Merseyside and North Wales Electricity Board asking for an electric power supply to be provided urgently to the districts of Bronygarth and Pontfaen on the Shropshire-Denbighshire border.

Plymouth

An inquiry took place recently into the proposal of the South Western Electricity Board to provide supplies by overhead lines to two new housing estates at Powisland and Birdcage, Roborough. Plymouth Corporation objected to the proposal. At the inquiry, Mr. D. S. Bentham, for the Board, said they felt that the type of development and the nature of the surrounding country should allow the erection of o.h. lines. Increasing costs of construction also made it necessary to economise. The city engineer, Mr. J. Paton Watson, explained that private development was just beginning in that part of the city. Private building should increase, in view of the recent Government statements on housing, and the district concerned was the one most likely to be favoured by potential owner-occupiers who wanted to live within the city. The Corporation's view was that overhead cables broke up the skyline and made it untidy. Mr. Haydon said the area came under the control of the Corporation in 1951. Previously the area was the responsibility of Plympton Rural Council, and while the Corporation's policy was to build underground lines, the Rural Council used overhead cables. The electricity undertaking was expected to try to follow the policy established by the Corporation.

Mr. H. W. Grimmitt, who conducted the inquiry for the Ministry of Fuel and Power, and representatives of both sides later visited the sites. The findings will be announced.

Seaton Valley

The Urban Council has asked the North Eastern Electricity Board to take over as soon as possible from the National Coal Board the control of the network in the Seghill area.

Shetland

The Shetland County Council has now received the reply of the North of Scotland Hydro Electric Board to the former's suggestion for using the peat deposits in Shetland to fire a generating station. The Board states that, at the instigation of the Board and the Scottish Peat Committee, experiments have been going on for some time on the burning of peat in a gas turbine at John Brown and Co.'s works at Glasgow. It is hoped in due course to make an important full-scale experiment on a site in the North of Scotland. The letter adds that the Board will keep in view the peat deposits in Shetland.

LIGHTING SCHEMES

Ashton-under-Lyne.—The Markets and Public Lighting Committee has recommended the adoption of a ripple relay system for controlling street lighting.

Chislhurst and Sidcup.—A scheme for electric lighting along four main routes has been approved by U.D.C. Estimated cost £14,819.

Exmouth.—The Roads and Works Committee has agreed that housing estates will in future be provided with mercury vapour lamps.

Hove.—T.C. has approved an amended scheme for improved lighting of Kingsway, at a cost of £6,920.

Lancing.—The conversion of street lighting from gas to electricity, to cost £6,338 may have to be spread over two or three years, the M.o.T. has told the Council.

Peterborough.—T.C. propose street lighting scheme for new Dogsthorpe North estate, at a cost of over £3,500.

Walsall.—T.C. propose to install mercury vapour lighting in Sneyd Lane and Lichfield Road, at a cost of £6,300, and in Leamore Lane and Hatherton Lane at a cost of £2,720.

Company Activities . . .

Barton & Sons

The resolution authorising the capitalisation of £101,250 out of reserves, and the issue to stockholders of one fully paid Ordinary share of 5s. for every four 5s. Ordinary units held, was approved at the meeting last week.

British Oxygen Co.

Acceptances were received covering approximately 97% of the recent "rights" issue, the directors state. Additional shares applied for amounted to twenty times in excess of the number available. Allotment letters have been sent out, applications for additional shares up to 10 shares being allotted in full.

Burgess Products Ltd.

Increased profits are recorded in the first complete year of operation as a public company. The net profit is £78,712 for the year to July 31 last, against £56,673 for 1950-51. The Ordinary dividend also is raised by 2½% to 25%. The sum of £50,000 has been placed to general reserve, while the stock reserve of £25,000 at July 31 last has also been transferred to general reserve.

Cawnpore Electric Supply Corporation Ltd.

The report of the joint liquidators covering the two years to October 25 last, shows that £2,049 has been handed to the Board of Trade—the amount of unpresented dividend warrants, etc.—and £670,000 out of surplus funds in hand paid into the company's liquidation account. The sum of Rs.250,000 also had to be remitted to Kanpur to meet the balance of income tax on interest received by the liquidators from the United Provinces Government on the purchase price of the undertaking. It is not yet possible to make a further distribution, the liquidators add, as this depends upon the final settlement of outstanding tax questions.

General Cable Manufacturing Co.

This concern had a very satisfactory year it would seem from the brief statistics given in the preliminary statement for the twelve months ended September 30 last. The profit amounted to £133,174 compared with £108,444 for the previous year. Although the total dividend is maintained at 30% the second interim was payable on the larger capital.

International Combustion (Holdings)

Shareholders have approved the resolutions involving an increase in the capital. A total of 4 million 5s. shares are to be created under the proposals which we noted in our December 11 issue.

Murex Ltd.

Shareholders applied for 192,096 of the 200,000 Ordinary shares of £1 offered at 48s. each, leaving 7,904 shares to be taken up by the underwriters. These new shares do not participate in the interim dividend also just announced.

Dividends Declared

Palestine Electric Corpn., Ltd.—The directors have decided that the dividend on the 4½% Cumulative Preference stock and on the 4½% Second Cumulative Preference stock due on January 1, shall be paid out of the accumulated revenue reserves, it being clear, on the basis of information now available, that the accounts for 1952 will show a loss.

Rothermel Corporation, Ltd.—Interim of 10% (*same*).

Murex, Ltd.—Interim of 6% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Jan. 2.—Macclesfield. Electric lamps and sundries for electrical and engineering maintenance dept. included in list of supplies for Parkside Hospital. Applications by above date to Supplies Officer at the Hospital.

Jan. 3.—Leeds. Tenders invited for six auto-transformer starters, 2,000 V, as floor mounting control units capable of starting pump motors from 29 h.p. to 105 h.p. three times an hour under no load conditions. Sewerage Engineer, Civic Hall.

Jan. 5.—Bletchley U.D.C. Nine sets of electrically driven vertical unchokable sewage pumps and ancillary equipment for three pumping stations. Engineers are John Taylor and Sons, Artillery House, Victoria St., London S.W.1. Deposit £5.

Jan. 5.—Northern Ireland. Electrical work in 386 dwellings on Rathcole No. 4 site, Whitehouse. N. Ireland Housing Trust, 12 Hope St., Belfast. Deposit 10s.

Jan. 5.—Wortley R.D.C. Installation of electricity in 96 and 52 houses at Oughtbridge, 52 at Stannington and 24 at Loxley. Arthur Wikeley, Engineer and Surveyor, Council Offices, Grenoside, nr. Sheffield. Deposit £2 2s.

Jan. 6.—Morecambe and Heysham T.C. Electrical installation in erection of 12 flats on Blackberry Hall estate. Borough Surveyor, Town Hall. Deposit £1.

Jan. 6.—West Riding. Renewal of electrical installation at Cleckheaton fire station. County Architect, Bishopgarth, Westfield Rd., Wakefield.

Jan. 7.—Macclesfield T.C. Supply and erection of 113 sodium lighting units on concrete collumns in Class A for Chester, Chelford and Buxton Rds. J. H. Dossett, Borough Engineer, Town Hall. Deposit £2 2s. (See Dec. 11 issue).

Jan. 7.—Oldbury T.C. Supply of fluorescent lighting fittings for Municipal Bldgs., Surveyor's and Education Depts. Borough Surveyor's Architectural Dept., Municipal Bldgs. Deposit £2 2s.

Jan. 7.—Sedgley U.D.C. Supply and erection of 19 precast columns, of which 18 shall have 60 W tungsten lighting equipment and one 80 W mercury equipment, with all necessary gear, for Class B street lighting on Modenhill estate. W. M. Jones, Engineer and Surveyor, The Limes, Dudley Rd.

Jan. 8.—Kidsgrove U.D.C. Supply and installation of necessary flashing control gear, fittings, etc., for illuminating beacons at pedestrian crossings. Engineer and Surveyor, Town Hall.

Jan. 10. — Camborne-Redruth U.D.C. Supply of equipment for illumination of ten pedestrian crossings. Engineer and Surveyor, Council Offices, Camborne.

Jan. 10.—Dagenham T.C. List of supplies for year beginning April 1 next includes electrical lamps and supplies. Borough Engineer and Surveyor, Civic Centre.

Jan. 10.—Finsbury B.C. Electric lamps included in list of supplies required in year begining April 1 next. Borough Engineer, Finsbury Town Hall Annexe, Rosebery Ave., E.C.1.

Jan. 10.—Peterborough. Lighting and power installations in 116 houses on Dogsthorpe North estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s.

Jan. 10.—Romford T.C. Supplies of electric lamps required during year ending March 31, 1954. Borough Engineer and Surveyor, Town Hall.

Jan. 12.—Camberwell B.C. Electric lamps included in list of supplies required during year beginning April 1, 1953. Borough Engineer and Surveyor, Town Hall, S.E.5.

Jan. 12.—Dartford T.C. Supply and erection of 97 street lighting units, comprising 80 W mercury lamps, enclosed lanterns and cast-iron columns, for Temple Hill Neighbourhood unit. T. Armstrong, Town Clerk, Dartford. Deposit £2 2s.

Jan. 13.—Belfast. Tenders invited for requirements for annual stores, including electrical accessories, insulating material, trolleyhead spares, overhead line equipment, and trolleybus electrical equipment spares. Transport Dept., Sandy Row. Depot, Belfast.

Jan. 13.—Bentley-with-Arksey (Yorks) U.D.C. Electrical installation in 36 houses at Scunthorpe. Surveyor, Council offices, Cooke St. Deposit £2 2s.

Jan. 13.—West Riding. Renewal of electrical installation at Harrogate fire station. County Architect, Bishopgarth, Westfield Rd., Wakefield.

Jan. 14.—Macclesfield R.D.C. Supply and installation of 34 sodium lighting units and concrete columns in Class B, for Weston Estate, Gawsworth. K. Shatwell, Clerk of Gawsworth Parish Council, Council Offices, King Edward Street, Macclesfield. Deposit £2 2s. Also same for 16 sodium units on concrete columns in Class B for same estate. J. H. Dossett, Borough Engineer, Town Hall, Macclesfield. Deposit £2 2s. (Both advertised Dec. 11).

Jan. 16.—Belfast. Supply and erection of integrating and summation metering equipment for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Dec. 4 issue.)

Jan. 16.—Leicester. Supply and erection of lamps, columns and fittings and laying cables for lighting of Swannington roundabouts. County Engineer and Surveyor, Grey Friars, Leicester. Deposit £5.

Jan. 16.—Londonderry. Electrical installation at Eglinton New School. Documents from Education Office, New Row, Coleraine. Deposit £1.

Jan. 16.—Swinton and Pendlebury T.C. Provision and erection of concrete columns, bracket arms and wiring for street lighting in Station Rd. Also supply of lanterns, lamps and auxiliary equipment for same. (Separate contracts.) Borough Engineer and Surveyor, Town Hall, Swinton. Deposit £2.

Jan. 17.—Baildon U.D.C. Electrical work at Birch Close Farm

and Weecher Reservoir Cottage, Bingley. Council's water engineer, Town Hall. Also provision of equipment for six 2-point flashing beacons. Council's Surveyor, Town Hall. Separate contracts.

Jan. 20.—Birkenhead T.C. List of annual supplies required by Ferries Dept., for year ending March 31, 1954, includes electric lamps. Ferries Manager, Woodside.

Jan. 21.—Blackpool T.C. Provision of three illuminated archways in Preston and Poulton New Rds. and South Promenade, by tungsten and cold cathode lighting. Illuminations and Public St. Lighting Officer, Electrical Services Dept., Rigby Rd. East. (Advertised in this issue.)

Jan. 21.—Fareham U.D.C. Electrical fittings included in list of materials required for year ending Mar. 31, 1954. Engineer and Surveyor, Westbury Manor.

Jan. 21.—Wandsworth B.C. Supply of 219 lanterns and 213 columns, and erection with all operating gear. Borough Engineer, Municipal Buildings, S.W.18. (Advertised in this issue.)

Jan. 24. — Ruislip-Northwood U.D.C. Supplies required during years beginning April 1 next include electric lamps. Engineer and Surveyor, Council Offices, Northwood, Middx.

Jan. 26.—Kesteven. Electrical installation at Grantham King's School. Applications by Jan. 3 to J. W. H. Barnes, county architect, County Offices, Sleaford, Lincs.

Jan. 26.—West Riding. Reinstatement of electrical installation at Castleford Whitwood Mining and Technical College. County Architect, Bishopgarth, Westfield Rd., Wakefield. Deposit £2 2s. (Advertised in this issue.)

Jan. 27.—Caithness. Tenders invited for electrical work in 72 houses on various estates—1953 building programme. W. Wilson, County Architect, Wick.

Jan. 27.—Wrexham T.C. Supply of columns, time switches, lanterns and equipment and installation of 102 sodium units and 22 fluorescent units for street lighting on trunk road A483. Borough Engineer and Surveyor, 31 Chester Street. Deposit £2 2s.

Jan. 31.—Sevenoaks U.D.C. Re-wiring in screwed conduit throughout swimming and slipper baths. Engineer and Surveyor, Council Offices, Argyle Rd. Deposit £2 2s. (Advertised in this issue.)

Jan. 31. — West Lancashire R.D.C. Supply, erection, etc., of 53 sodium lighting units on concrete columns along (approx.) 1,810 yd. of Liverpool-Preston Rd. at Maghull. R.D.C. Office, 52 Derby St., Ormskirk. Deposit £2 2s. (Advertised in this issue.)

No date stated.—Lancashire. Supply and erection of 7 columns and lanterns at Hulton and Maghull roundabouts on A.59. County Architect, County Hall Preston. Deposit £2.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

Jan. 21.—India. Directorate General of Supplies and Disposals, Shahjahan Rd., New Delhi, invites tenders for supply of detectors, expanders, repeaters, elements, etc. B.o.T. (Ref. CRE 42492/52).*

Jan. 27.—New Zealand. Post and Telegraph Dept., Wellington, requires supply of 650 carbon type resistors and 100 condensers, to various specifications. Director-General (Stores Division), G.P.O., Wellington. B.o.T. (Ref.: CRE 41806/52).*

Jan. 30.—Belgian Congo. Supply of two 300 kVA transformers, transformer boxes and electric cables. Service des Approvisionnements du Ministere des Colonies, 14 Rue des Petits Cormes, Brussels. B.o.T. (Ref.: CRE 42403/52).*

Feb. 3.—New Zealand. Supply of quantities of copper wire to various specifications for Director - General (Stores Div.), G.P.O., Wellington. B.o.T. (Ref.: CRE 42673/52)*.

Feb. 5.—South Africa. Supply, erection and initial operation of four electric motor-driven centrifugal-type circulating water pumps, and overhead electric travelling crane (Contract GK9); outdoor power transformers (Contract GK11); and an evaporating plant for distilling 25,000 lb water per hour. Documents from Electricity Dept., President St. West, Johannesburg. Deposit £3 3s.

April 14.—New Zealand. Supply of 150 MVA 11 kV switchgear for Motupipi substation. Secretary, Tenders Committee, State Hydro-Electric Dept., Wellington C.1. (Ref. CRE 42674/52).*

Your Queries Answered

"Magnavista" lenses, makers of? H.R.—Metro-Pex Ltd., 42a Denmark Hill, S.E.5. (24685)

"Lincass" appliances, makers of? D.L.—H. Cassirer Ltd., 31 Pinner Rd., Harrow, Middx. (24692)

London and Home Counties Regional Advisory Council for Higher Technological Education, address of? B.W.—Tavistock House South, Tavistock Square, W.C.1. (24704)

Swivel mirrors for use in servicing television sets, makers of ? T.B.—Gowllands Ltd., 176 Morland Rd., Croydon. (24712)

"Simplex" hairdryers, makers of? B.B.—These were made by I. Calvete Ltd., a firm which can no longer be traced. Try Osborne Garrett and Co. Ltd., 51 Frith St., W.1, regarding repairs. (24719)

"Zephyr" hairdryers, makers of? S.E.—The Bylock Electric Ltd., South St., Ponders End, Enfield, Middx., produce a hand type hairdryer under this name. The Apex Hairdressing Equipment Co. Ltd. marketed a hood type under the same name, but there has been no trace of this concern since 1948. (24726)

FURTHER ANSWER

Swedish ASEA, address of? F.B. — A.S.E.A., Vasteras, Sweden, the agents being ASEA Electric Ltd., Fulbourne Rd., London, E.17. (24732)

The above are selected from questions we have answered this week. If you have a query, send it to us.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 113 Chancery Lane, London W.C.2.

Regal Wholesale Electrical Ltd., 16 Deansgate, Manchester. Cap.: £1,000. Dirs.: E. Abell, and Lily Abell.

J. A. Somerset (Engineers) Ltd. To take over business of electrical and mechanical engineers carried on at 30 Bath St., Moss Side, Manchester, by John A. Somerset. Cap.: £6,000. Dirs.: to be appointed by subs. Subs.: J. A. Somerset and Mrs. M. J. Somerset, Cloud End, Hartley Rd., Altrincham, Ches.

Spencer Electronics Ltd., 5 Shakespeare Rd., Finchley N.3. Cap.: £1,100. Dirs.: E. G. Orlich and K. S. S. Spencer.

Stagesound (Production) Ltd., 16 Gerrard St., W. 1. To take over business of manufacturers of sound reproducing equipment, etc., carried on by Stagesound (London), Ltd., at 3 Dansey Place, W.1. Cap.: £5,000. Dirs.: W. F. Walton, Diana H. M. Plunkett, J. H. Madre and E. J. W. Turner.

A. G. Stevens and Co., Ltd., 418 West Green Rd., Tottenham, N.15. Mechanical, electrical, lift, crane, elevator and constructional engineers, etc. Cap.: £3,600. Dirs.: L. G. Norris, Winifred M. Stevens and K. Rounsivell.

Tattersall Machine Co., Ltd., Carbon Chambers, 7b Hall Gate, Doncaster. Mechanical, electrical and general engineers, manufacturers of and dealers in automatic and other types of weighing, calculating and measuring machines, etc. Cap.: £1,000. Dirs.: W. Mortimer and J. W. Tattersall.

CONTRACTS PLACED

Chelsea B.C. Supply of flashing beacons and ancillary equipment, London Electricity Board, £3,903. Also electrification works at Old Pond House, Rawlings Bros. Ltd., £1,993.

Darlington T.C. Electrical installation at new high school for girls, Troughton and Young.

Ealing T.C. Supply of fittings for illumination of pedestrian crossings, Franco Traffic Signs Ltd., £1,130.

Nantwich (Chesh.) R.D.C. Complete electrical installation in 74 houses on various sites. Harrison's, £1,914.

Peterborough. Electrical installation in Thorpe Rd. Hostel for Aged. Johnson, Pearce and Co. Ltd., £1,393.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	285 0 0	—
LEAD, good soft pig (foreign)	108 10 0	116 0 0
" " "English" quality	110 0 0	
TIN (99–99·76%) (Cash)	949-950	—
" (3 months)	943-944½	—
ALUMINIUM, commercial purity (del.)	166 0 0	—
ZINC	110 0 0	100 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	53 0 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Edstone Ltd. Resolution for voluntary winding up passed at meeting on Dec. 10, when Kenneth D. Haynes, 7 Great Castle St., London W.1, was appointed liquidator.

T. and H. Electrical Service Ltd. Creditors are requested to send particulars to liquidator, Norman W. Osborne, 11-12 Finsbury Sq., London E.C.2, by Jan. 19.

Electronic Manufacturing and Development Co. Ltd., Lincoln. Winding-up order dated Dec. 15. Petition presented on Dec. 3.

Accessories Supply Co. Ltd. Meetings of creditors and contributories will take place at Official Receivers' Office, 55 Queen St., Sheffield, on Jan. 6, at 2.30 p.m. and 3 p.m. resp.

Smith and Russell (Caseley) Ltd. Last day for receiving proofs in respect of intended dividends, Jan. 9. Liquidator is R. K. Clark, Somerset House, 37 Temple St., Birmingham.

G.M.V. Engineering Co. (London) Ltd. Creditors are asked to send particulars to liquidator, L. C. E. Webber, C.A., 32 Queen Anne St., W.1, by Jan. 16.

Voluntary Liquidation

Alstans Electrical Ltd. At statutory meeting of creditors, statement of affairs disclosed liabilities of £2,431 against net assets of £1,484, leaving deficiency as regarded creditors of £947. Issued share capital was £669 and, so far as shareholders were concerned, there was total deficiency of £1,616. Resolutions passed confirming voluntary liquidation with R. F. Bendall, C.A., of Poppleton and Appleby, Birmingham, as liquidator, with committee of inspection. Creditors are asked to send particulars to liquidator by Jan. 31.

BANKRUPTCY ACTS

Receiving Orders

Cardiff. Frederick J. Hocken, electrical retailer, trading at 18 Vere St. and 3 Vere St., Cadoxton, Barry. Date of receiving order, Dec. 15.

London. George Albert Watts, electrical engineer, trading as Watts and Watts at 185 Stockwell Rd. and 32 Moat Place, Stockwell, S.W.9. At first meeting of creditors Official Receiver reported that according to debtor's statement of affairs he had gross liabilities of £1,049 against assets of £420. Resolution passed for appointment of Mr. A. E. Attwood, Lawrence Lane, London E.C.2, as trustee of estate with committee of inspection.

Application for Discharge

Leeds. Ronald S. Lees, trading as R. S. Lees and Co., electrical factor, at 21 Gledhow Park Rd., Leeds. Hearing fixed for Jan. 28 at County Court House, Albion Pl., Leeds, at 10.15 a.m.

Companies Winding-up

G. E. Stephens (Grays) Ltd., electrical engineers. At first meeting of creditors Official Receiver reported winding-up order made on Nov. 10. Statement of affairs showed unsecured liabilities of £2,539 and in addition there were preferential claims of £160. Gross assets estimated to realise £244, which left balance of £84 after deducting preferential claims, or deficiency as regarded creditors of £2,455. Resolution passed for appointment of Mr. L. C. E. Webber, C.A., 32 Queen Anne St., W.1, as liquidator, with committee of inspection.

First Meeting

Croydon. Kenneth J. Wilkes, radio and electrical dealer of 30 Catford Hill, S.E.6. Meeting at Central Buildings, Matthew Park St., S.W.1, on Jan 7 at 11 a.m. and public exam at County Court, Croydon, on Jan. 29 at 11 a.m.

BUSINESS PROSPECTS

HOME

Barnsley. Extension of Mining and Technical College in Church Street will be carried out during 1953-54.

Barrow-in-Furness T.C. Erection of Walney nursery school, J. N. Flitcroft, Borough Engineer and Surveyor, Town Hall.

Berwick T.C. It is proposed to build 64 houses on Prior Park estate, and 28 in Lions Gardens, Ravensdowne.

Birmingham. Construction of 76 dwellings at Northfield, 36 and 6 at King's Heath and 12 at Lozells. H. J. Manzoni, City Engineer and Surveyor, Civic Centre.

Carlisle. £1,384 is to be spent on provision of flashing units at pedestrian crossings.

Cheltenham. Plans submitted for erection of stores, workshops and offices in Northfield Terrace for L. A. Jackman and Son Ltd.

Cowbridge (Glam.) R.D.C. Erection of 40 houses on St. Athan estate. Council's surveyor, W. R. Hawkins, 41 Eastgate Street.

Dublin. Construction of 286 houses in St. Anne's area. City Treasurer, Exchange Buildings, Lord Edward Street.

Ealing. It is proposed to extend premises at Krema works in Sarsfield Road.

Eastbourne T.C. Erection of 48 houses on Langney Village estate. Borough Surveyor, 2 Saffrons Road.

Eston (York) U.D.C. Tenders to be invited for supply of flashing units for pedestrian crossings.

Gateshead. Building programme to include Hill Head secondary school, £132,600; and Lean Lane infants' school, £54,000.

Higham Ferrers (Northants) T.C. Approval given for erection of 39 houses as first development of Wykeham Rd. site.

Hitchin. Plans in hand for erection of secondary modern school for girls at Old Hale Way at estimated cost of £195,280.

Leeds. Scheme has been approved for blocks of flats in York Road area for re-housing of over 5,000 people.

Liverpool. Erection of 168 flats in Slade St. Director of Housing, Blackburn Chambers, Dale St., Kingsway.

Newcastle-on-Tyne. New tenders being obtained for erection of Stocksfield Ave. primary school.

Northumberland. Killingworth grammar school, costing £114,000, has been included in this year's building programme.

Peterlee (Dur.). New factory is to be built in New Town for Alexandre Ltd. of Leeds.

Prestwick T.C. Approval sought for erection of 78 houses in Adamton Rd. Estimated cost £123,023.

Reading T.C. Erection of Mid-West secondary boys' school. Borough Architeet, Town Hall.

Ripon. Council to build 280 houses in Lead Lane. Start to be made soon on first batch of 121 houses.

Roxburgh. Revised scheme for additional accommodation at Hawick high school has been approved. Estimated cost £15,500.

St. Albans. Construction of shops and flats on St. Julian's and New Greens sites. City Engineer and Surveyor, 16 St. Peter's Street.

OVERSEAS

Canada. Mr. K. O. Bardwell of 2327, 7th Avenue, N.W. Calgary, Alberta, wants to contact U.K. manufacturer willing to mass produce small domestic electric machines for removing snow from doorsteps, footpaths etc., which he has invented. Mr. Bardwell will undertake sales organisation for Canada and is prepared to come to Britain to discuss production etc.

India and Pakistan. Mr. P. F. R. Ayles, overseas director of Plummer Bros. and Co. (England) Ltd., 25 Culver Street, Colchester, has just returned from India and Pakistan, and is anxious to meet manufacturers in S.E. England interested in developing exports in the Middle East and Far East.

TRADE NOTES

Changes of Address. The Eastern Counties address of the Electrical Apparatus Co. Ltd. has been changed to: Commerce Chambers, High Street, Ipswich. Telephone: Ipswich 51791.

The Head Office and Sales Department of Alexander Duckham and Co. Ltd., are now at Hammersmith, London, W.6. Telephone: Fulham 3300.

Cable and Switch Gear (Farnley) Installation Ltd. have now moved to 303 Brixton Road, London, S.W.9. Tel.: Brixton 8004.

B.E.A.M.A. Contract Price Adjustment Formulae.—*For Electrical Machinery and Equipment:* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at December 13, 1952, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figure for Materials used in the Electrical Machinery Industry published in the Board of Trade Journal on December 13, 1952, is 161·8.

For Turbo-Generating and Allied Plant: For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at December 13, 1952, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on December 13, 1952, are: Materials used in Mechanical Engineering Industries, 147·8. "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)," 142·7. The price of brass condenser tubes ¾ in. o/d, 18 SWG published in The Metal Bulletin on December 12, 1952, is 3s. 11½d.

For outstanding Contracts covered by the B.O.T. Intermediate Products Index: For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at December 13, 1952, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figure for Intermediate Products published in the Board of Trade Journal on December 13, 1952, is 359·1.

Greek Imports. A number of commodities may now be imported into Greece outside the regular schedules. From Great Britain the items include electrical appliances and radio sets. Applications for imports must be made to the Foreign Trade Administration of the Greek Commerce Ministry by Jan. 10. Allocations will be granted, subject to the enclosure of a Bank certificate confirming the deposit of 10% of the F.O.B. value of the imports applied for.

MEETINGS TO NOTE

THURSDAY, JAN. 1

I.E.S. (Exeter Group).—Discussion on Home Lighting. Providence Hall, Northernhay St., 7 p.m.

A.S.E.E. (S. London Branch).—"Repair and Renovation of Electrical Apparatus." Cafe Royal, Croydon, 8 p.m.

FRIDAY, JAN. 2

I.E.S. (Bath and Bristol Centre).—Discussion on Home Lighting at Elect. Board Offices, Colston Ave., Bristol, 6.15 p.m.

I.E.S. (Birmingham Centre).—Exhibition of new Lighting Equipment at College of Technology, Suffolk St.

INSTN. OF MECHANICAL ENGRS.—"Interchangeability and Specification of Manufacturing Limits of Size as Influenced by Statistical Considerations." Capt. G. C. Adams. Storeys Gate, London S.W.1, 5.30 p.m.

SATURDAY, JAN. 3

BIRMINGHAM ELECTRIC CLUB.—Children's Party.

MONDAY, JAN. 5

A.S.E.E. (Leeds Branch).—"Contactor Type Switchgear." Gt. Northern Hotel, 7.30 p.m.

A.S.E.E. (N.E. London Branch).—"Principle of the Metadyne." D. H. Taylor. Angel Hotel, Ilford, 8 p.m.

I.E.E. (Merseyside and N. Wales Centre).—"Uses of Earthed Signal Conductors on Transmission Circuits." W. Casson. Liverpool Royal Instn., Colquith St., 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"High Gain d.c. Amplifiers." K. Kandish and D. E. Brown. King's College, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Centre).—"Post-Graduate Activities in Electrical Engineering." W. J. Gibbs, D. Edmundson, R. G. A. Dimmicks and G. S. C. Lucas. James Watt Inst., Great Charles St., Birmingham, 6 p.m.

I.E.E. (Western Supply and Utilisation Groups).—"Use of Electricity in Modern Iron and Steel Works." W. F. Cartwright. S. Wales Inst. of Engineers, Park Place, Cardiff, 6 p.m.

I.E.E. (Ipswich).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest, and F. J. Lane. Crown and Anchor Hotel, 6.30 p.m.

E.P.E.A. (London Tech. Group).—"Measurement of Insulation." Dr. J. S. Forrest. Caxton Hall, Westminster, S.W.1, 7 p.m.

TUESDAY, JAN. 6

I.E.E. (London Measurements and Radio Sections).—"Improvement Scanning Electron Microscope for Opaque Specimens." D. McMullen. Savoy Place, W.C.2, 5.30 p.m.

INCORP. PLANT ENGRS. (London).—Discussion on The National Fuel Policy. Royal Soc. of Arts, Strand, 7 p.m.

INCORP. PLANT ENGRS. (S. Wales Branch).—"Plant Engineer tours America." G. E. Halter. Inst. of Engineers, Park Place, Cardiff, 7.15 p.m.

I.E.E. (N. Midland Centre).—"Electronic Telephone Exchanges." T. H. Flowers. Y.E.B., 1 Whitehall Rd., Leeds, 6.30 p.m.

I.E.E. (N.W. Centre).—"Characteristics and Control of Rectifier Motor Variable Speed Drives." P. Bingley. Engineers Club, Albert Sq., Manchester, 6.15 p.m.

ENGINEERS GUILD (W. Midlands Branch).—"Presentation of Technical Information." Prof. R. O. Kapp. Imperial Hotel, Birmingham, 6.30 p.m.

INST. OF FUEL (Scottish Section).—"Ridley Report and After." G. Nabarro. Royal Tech. College, Glasgow, 7 p.m.

A.S.E.E. (S.E. London Branch).—"Electro Static Precipitation." S. L. Walker. Congregational Church Hall, Court Rd., Eltham, 8 p.m.

A.S.E.E. (W. London Branch).—"Some Changes in Installation Practice during a Quarter of a Century." J. Flood. Windsor Castle Hotel, King St., Hammersmith, 7.30 p.m.

A.S.E.E. (Nottingham Branch).—"Modern Fixing Practice." R. P. Dunn. Elect. Showrooms, Smithy Row, 7.30 p.m.

WEDNESDAY, JAN. 7

I.E.S. (Edinburgh Centre).—"Colour and Framework to Industry." Mrs. D. M. Buckland. Lighting and Cleansing Dept., 357 High St., 7 p.m.

I.E.S. (Newcastle Centre).—"Museum and Art Gallery Lighting." W. E. Rawson-Boltom. Roadway House, 8 Oxford Street, 6.15 p.m.

I.E.E. (Tees-side Sub-centre).—"Domestic Electrical Installations: Some Safety Aspects." H. W. Swann. Cleveland Scientific and Technical Inst., Middlesbrough, 6.30 p.m.

I.E.E. (N.W. Radio Group).—"Nervous System as Communication Network." J. A. V. Bates. Engineers Club, Albert Sq., Manchester, 6.30 p.m.

I.E.E. (N. Scotland sub-centre).—"Economics of l.v. supplies to New Housing Estates." F. G. Copland. Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.E. (Southern Centre).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest and F. J. Lane. Technical College, Brighton, 6.30 p.m.

A.S.E.E. (N. London Branch).—"Photo Electric Cells." Three Jolly Butchers Hotel, Wood Green, 8.15 p.m.

THURSDAY, JAN. 8

I.E.S. (Glasgow Centre).—"Colour as Framework to Industry." Mrs. D. M. Buckland. 39 Elmbank Crescent, 6.30 p.m.

I.E.S. (Manchester Centre).—"Lighting in Food Industry." R. L. C. Tate. N.W. Elect. Board, Town Hall Extension, 6 p.m.

I.E.S. (Nottingham Centre).—Student Members' Viewpoints by J. Eddyshaw, W. Mosedale, N. S. Rutherford and J. R. Wakefield. Elect. Board, Smithy Row, 6 p.m.

I.E.E. (London).—"Nuclear Reactors and Applications" by Sir John Cockcroft, at 4.30 p.m., also papers on "Nuclear Reactor Instrumentation" at 6 p.m. Savoy Place, W.C.2.

INCORP. PLANT ENGRS. (Newcastle Branch).—"Preventative Maintenance." T. G. Robinson. Roadway House, Oxford St., 7.30 p.m.

I.E.E. (N. Scotland sub-centre).—"Economics of l.v. supplies to new Housing Estates." F. G. Cupland. Royal Hotel, Dundee, 7 p.m.

INSTN. OF WORKS MANAGERS (Wembley sub-branch).—"Space Heating of Buildings and Conditions of Comfort." Dr. E. H. Mundel. The Plough, Kenton Rd., Kenton, 12.30 p.m.

E.P.E.A. (Merseyside Tech. Group).—"Water Softening," F. W. Dale. Elect. Showrooms, Whitechapel, Liverpool, 7 p.m.

FRIDAY, JAN. 9

I.E.S. (Birmingham Centre).—Annual dinner.

I.E.E. (N. Staffs sub-centre).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest and F. J. Lane. Oddfellows' Hall, Stafford, 7 p.m.

A.S.E.E. (Crewe Branch).—"Small Transformer Design." C. N. W. Breece. Royal Hotel, Nantwich Rd., 7.30 p.m.

A.S.E.E. (Liverpool Branch).—"Modern Fixing Practice." H. T. Springings. Engineering Soc., 9 The Temple, Dale St., 7.30 p.m.

EXHIBITION DIARY

Packaging Exbn. Third show will open at Olympia on Jan. 20. It closes on Jan. 30.

Amusement Trades Exbn. Ninth annual exbn. will take place at Old Royal Horticultural Hall, Westminster, between Jan. 27 and 29.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Ace. 709,934. Class 9. Switches and sockets all being electrical goods. J. A. Crabtree and Co. Ltd., Lincoln Works, Lincoln Rd., Walsall, Staffs.

Cameo. 708,449. Class 9. Radio and television, sound recording and reproducing apparatus, etc. Rees Mace Marine Ltd., 11 Hinde St., W.1.

Dorman Diolume. 711,065. Class 11. Electric light fittings. Dorman and Smith Ltd., Ordsall Electrical Works, Salford 5, Lancaster.

Essoldomatic. 704,270. Class 9. Scientific, cinematographic, sound reproduction and electrical apparatus. Essoldo Circuit (Control) Ltd., Norwich Union Chambers, 42 Westgate Rd., Newcastle-on-Tyne.

BERGER HOUSE

Architects:
HOWARD, SOUSTER & PARTNERS
81 Piccadilly, W.1

Consulting Architects:
J. STANLEY BEARD, BENNETT & WILKINS
101-3 Baker Street, W.1

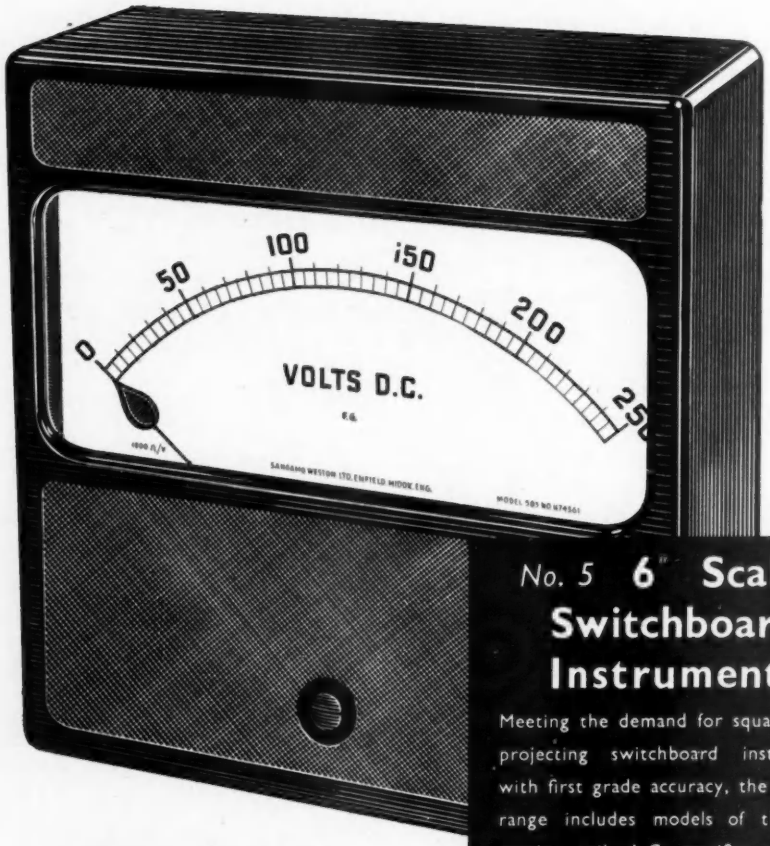
A handsome office block in London's famous Berkeley Square completed recently for Lewis Berger & Sons, Ltd.

Wired throughout with

HENLEY CABLES

Electrical Contractors:
BERKELEY ELECTRICAL ENGINEERING CO. LTD.
Vincent Square, London, S.W.1

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1



No. 5 6" Scale Switchboard Instruments

Meeting the demand for square cased projecting switchboard instruments with first grade accuracy, the Weston range includes models of the D.C. moving coil, A.C. rectifier and H.F. thermocouple types, as well as the moving iron type. The model S.83 illustrated, is fitted with a 6" scale and pear shaped pointer for ease of reading. Send for details of Weston switchboard instruments. The full Weston range includes panel, switchboard, portable, sub-standard and laboratory standard instruments.

WESTON

Electrical Measuring Instruments

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) & 1242 (4 lines). Grams: Sanwest, Enfield

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED . FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF BLACKPOOL

THE CORPORATION are considering the provision of three ILLUMINATED ARCHWAYS for:—

1. Preston New Road.
2. Poulton New Road.
3. South Promenade.

and tenders are invited for:—

(a) The supply of materials, construction and erection of the archways in concrete, metal or wood.
(b) The electrical equipment and installation required for the scheme of illumintaion by tungsten and cold-cathode lighting.

Forms of Tender, specifications, drawings and general conditions may be obtained from the Illuminations and Public Street Lighting Officer, Electrical Services Department, Rigby Road East, Blackpool. Tenders are to be addressed to the undersigned and delivered in a plain sealed envelope endorsed "Illuminated Arches" (giving the reference number stated in the specification) to reach him not later than first post on Wednesday, January 21, 1953.

The Corporation do not bind themselves to accept the lowest or any tender.

TREVOR T. JONES,
Town Clerk.
(C 265)

WEST LANCASHIRE RURAL DISTRICT COUNCIL

STREET LIGHTING—TRUNK ROAD A.59

TENDERS are invited for the SUPPLY, ERECTION and COMMISSIONING of 53 sodium vapour discharge lighting units on concrete standards, on approximately 1,810 yards of the Liverpool-Preston Trunk Road A.59 (Northway), in the Parish of Maghull within the West Lancashire Rural District.

The drawings and general conditions of contract may be inspected at the West Lancashire R.D.C. Office, 52 Derby Street, Ormskirk, or at the City Lighting Department, 17 Highfield Street, Liverpool 3, and copies of the special conditions of contract, specification, plan and form of tender may be obtained from the former on payment of a deposit of two guineas, which will be refunded upon receipt of a bona-fide tender.

Tenders, in a plain, sealed envelope endorsed "Tender for Street Lighting," are to be forwarded to the undersigned not later than January 31, 1953.

The Council do not bind themselves to accept the lowest or any tender.

HENRY THISTLETHWAITE,
Clerk of the Council.

52 Derby Street,
Ormskirk. (C 220)

CITY OF PETERBOROUGH

THE COUNCIL invites TENDERS from recognised electrical contractors for the electric lighting and power installations to 116 permanent houses on the Dogsthorpe North Estate, Peterborough.

Drawings, specifications and forms of tender may be obtained on application to Mr F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications, before noon on Saturday, January 10, 1953, should be accompanied by a cheque for the value of £2 2s., made payable to the Peterborough City Council, which will be returned on receipt of a bona-fide tender or the return of the documents.

The Council does not bind itself to accept the lowest or any tender.

C. PETER CLARKE,
Town Clerk.

Town Hall, Peterborough,
December, 1952. (C 217)

URBAN DISTRICT COUNCIL OF SEVENOAKS

SWIMMING AND SLIPPER BATHS
ELECTRICAL INSTALLATION

TENDERS are invited for the DISCONNECTION and REMOVAL of the existing installation and rewiring in screwed conduit throughout the building housing the Swimming and Slipper Baths.

Forms of tender and specification may be obtained from and the conditions of tender examined at the office of the Engineer and Surveyor, Council Offices, Argyle Road, Sevenoaks, upon the receipt of two guineas, which sum will be returned upon the receipt of a bona-fide tender.

Tenders must be delivered to the undersigned, in the envelope provided, not later than 12 noon on Saturday, January 31, 1953.

The Council do not bind themselves to accept the lowest or any tender.

GEO. T. BRADBURY,
Clerk of the Council.

Council Offices,
Argyle Road,
Sevenoaks, Kent.
December, 1952. (C 219)

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TENDERS are invited for the REINSTATEMENT of ELECTRICAL INSTALLATION after fire at the Castleford Whitwood Mining and Technical College.

Specification with plans, together with conditions of tender, may be obtained on application to the County Architect, "Bishopgarth," Westfield Road, Wakefield on payment of a deposit of £2 2s., which will be returned on receipt of a bona-fide tender. Cheques must be made payable to the "West Riding Treasurer," and crossed "& Co."

Sealed tenders must be addressed to me, the undersigned, and received at Room 3, County Hall, Wakefield, not later than 10 a.m. on Monday, January 26, 1953.

BERNARD KENYON,
Clerk of the County Council.

December, 1952. (C 216)

METROPOLITAN BOROUGH OF WANDSWORTH

STREET LIGHTING

TENDERS are invited for the SUPPLY of 219 sodium lanterns and 213 columns and for their erection complete with all operating gear of which the time switches and lamps will be supplied by the Council.

Tender forms, specifications, etc., which may be obtained from the Borough Engineer, at this address, must reach me by noon, January 21, 1953.

R. H. JERMAN,
Town Clerk.

Municipal Buildings,
Wandsworth, S.W.18. (C 218)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ELECTRICAL LAYOUT DRAUGHTSMAN required, preferably with experience in layout of power station electrical services and also outdoor type high-voltage substations.—Apply to Kennedy and Donkin, 12 Caxton Street, S.W.1. Ref. R.H. (C 235)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF SENIOR DRAUGHTSMAN (ELECTRICAL)

Chief Engineer's Department, Area Board Headquarters.

APPLICANTS should have had a good technical training and drawing office experience in the electrical design, layout and detailing of indoor and outdoor substations up to 33,000 V, together with the preparation of protection, schematic and wiring diagrams.

Preference will be given to holders of the O.N.C. or H.N.C. in electrical engineering.

Salary scale: £567 to £671 p.a. Schedule "D", Grade 5. N.J.B. conditions.

Applications to Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, by January 10, 1953.

APPOINTMENT OF GENERAL ASSISTANT ENGINEER (TESTING ASSISTANT)

Sub Area Testing Station, Ardwick, Manchester.

Applicants should be experienced in testing meters, instruments (including standardisation), cables, protection equipment and substation plant and should hold the H.N.C. in electrical engineering or its equivalent. Experience in a manufacturer's work will be an advantage.

Salary scale: £661 to £681 p.a. Grade M.13. N.J.B. conditions.

Applications to Sub-Area Secretary, No. 1 Sub-Area, The North Western Electricity Board, Town Hall Extension, Manchester 2, P.O. Box 493, by January 10, 1953.

APPOINTMENT OF GENERAL ASSISTANT ENGINEER (TESTING ASSISTANT)

Sub-Area Testing Station, Walkden.

Applicants should be experienced in general testing work on a distribution system, including laboratory and field testing of protective gear, h.v. cables, switchgear and Ripple control equipment. Experience in testing and installation of industrial metering equipment will be an advantage. Applicants should preferably be of H.N.C. (electrical engineering) standard.

Salary scale: £661 to £681 p.a. Grade M.13. N.J.B. conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, by January 10, 1953.

APPOINTMENT OF SENIOR DRAUGHTSMAN Blackpool.

Applicants should preferably have experience in the preparation of plans for new and existing buildings, electrical network diagrams, and the layout and construction of substations, and should be capable of taking charge of a drawing office.

Salary scale: £567 to £671 p.a. Schedule "D", Grade 5. N.J.B. conditions.

Persons who applied in response to the advertisement which appeared in the issue of September 11, 1952, need not re-apply as their applications will be considered along with others received in response to this advertisement.

APPOINTMENT OF ENGINEERING DRAUGHTSMEN Lancaster and Fleetwood.

Applicants should preferably be experienced in the preparation of plans for new, and modifications to existing buildings, electrical network diagrams and the layout and construction of substations. The possession of a technical certificate in electrical or mechanical engineering will be an advantage.

Salary scale: £433 to £567 p.a. Schedule "D", Grade 6. N.J.B. conditions.

Applications for the above posts to Sub-Area Manager, No. 4 Sub-Area, The North Western Electricity Board, 40-41 Lune Street, Preston, by January 10, 1953.

APPOINTMENT OF DISTRICT SENIOR CLERK Penrith District.

The person appointed will be responsible for the supervision and carrying out of all clerical functions in the district. Applicants should have had experience in the methods of meter reading, costing, invoices and stores, wages and conditions of service, correspondence and general office routine, and in dealing with consumers' inquiries, records and accounts.

Salary scale: £580 to £640 p.a. Grade 4. N.J.C. conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by January 10, 1953. (C 253)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS invited for the superannuable N.J.B. appointment of ASSISTANT MAINTENANCE ENGINEER (Electrical) at Newport Power Station. Salary "F.9" (£607 to £629 p.a.).

Applicants should have obtained H.N.C. (Electrical) and had experience in power station electrical maintenance.

Application forms obtainable from Divisional Secretary, British Electricity Authority, South Wales Division, Cardiff (Pengam Moors) Airport, Cardiff, should be returned by January 12, 1953. (C 266)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following posts in this Division:—

THIRD ASSISTANT ENGINEERS (ELECTRICAL)

Divisional H.Q. Vacancy No. 109/52

Applicants should have had a fundamental training in electrical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of switchgear transformers, electrical auxiliaries, main and multicore cablework, and lighting and heating installations for large power stations. Candidates should possess a university degree or equivalent qualification in electrical engineering.

The salary for the above appointment will be within Schedule "C," Class "AX/DX," Grade 5 (£649 to £858 p.a.), of the National Joint Board Agreement.

Closing date for receipt of applications, January 19, 1953.

The positions will be pensionable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Application forms may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(C 229)

LONDON ELECTRICITY BOARD

DESIGN AND PLANNING BRANCH

APPLICATIONS are invited for appointments in the Design and Planning Branch of the Chief Engineer's Department in Central London.

Applicants should have technical qualifications equivalent to Corporate Membership of the I.E.E. and have a wide experience of the design, operation or construction of h.v. and l.v. distribution systems and of the preparation of reports, estimates and specifications.

The commencing salary will be within the ranges of Class "AX," Grades 1, 2 or 5 of Schedule "C" of the National Joint Board Agreement for Area Boards, plus 5 per cent. for London Area, and subsequently will vary in accordance with the classification of the Area, which is now "DX," subject to the provisions of that Agreement. The inclusive ranges within Class "AX" are: Grade 1, £1,018 10s. to £1,153 per annum; Grade 2, £875 14s. to £1,018 10s. per annum; Grade 5, £681 9s. to £829 10s. per annum.

Application forms obtainable from the Establishments Officer, 46-47 New Broad Street, E.C.2, to be returned completed by January 10, 1953. Please enclose addressed foolscap envelope and quote Ref. V/1561.T on all correspondence. (C 227)

GOVERNMENT OF KUWAIT

DIESEL POWER STATION SHIFT ENGINEER required for service with the Government of Kuwait, Persian Gulf. Applicants should have some technical qualification and should not be more than 35 years of age. He should have good experience in the operation and maintenance of Diesel engines and generators, and also have sufficient electrical knowledge of an a.c. distribution system to be able to operate the power plant in the station efficiently. Steam power plant operation experience would be advantageous as at a later date a steam power station will be operating and it might be possible to transfer the services of the Diesel Power Station Shift Engineers over to the steam station. The starting consolidated salary offered is at the rate of £1,500 per annum, according to experience. Free furnished quarters and free medical attention are provided. The first year will be probationary, and if satisfactory home leave will be granted at the end of three complete years' service. Married accommodation cannot be promised within one year. Applications, stating age and giving full details of experience should, in the first instance, be addressed to the Secretary, Ewbank and Partners Ltd., 10/11 Grosvenor Place, London, S.W.1. (C 247)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

GENERAL ASSISTANT ENGINEER (COMMUNICATIONS) in the Technical Department based at Brighton. Applicant should preferably have reached Higher National Certificate standard in electrical engineering and must have had extensive experience and knowledge of telecommunications, including the installation and maintenance of automatic and line transmission telephone equipment. N.J.B. conditions of service and salary Class "AX," Grade 8, £501 to £639 p.a.—Applications, on forms obtainable from Establishment Officer, British Electricity Authority, S.E. Division, Lower Ham Road, Kingston-upon-Thames, should be received by him not later than January 10, 1953. (C 242)

SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER (LOCAL)

SWINDON District of No. 2 (Newbury) Sub-Area, located at Cirencester. Salary, N.J.B. Class "E," Grade 11, Column 1 (£524 per annum), N.J.B. conditions of service.

The duties of the post will be to assist the local engineer in the operation and maintenance of the L.V. and H.V. distribution systems including both mains and substations and in the laying or erection of services and minor mains extensions. Applicants must satisfy the Board that they have adequate technical knowledge, together with suitable experience of distribution work, particularly on overhead systems.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury and returned to him in envelopes suitably endorsed not later than January 12, 1953.

ASSISTANT ENGINEER (LOCAL)

Chichester District of No. 3 (Portsmouth) Sub-Area, located at Bognor. Salary N.J.B., Class "E," Grade 11, Column 1 (£524 per annum), N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed, not later than January 12, 1953.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible. (C 225)

BRITISH ELECTRICITY AUTHORITY

South Western Division

TECHNICAL DEPARTMENT VACANCIES

(a) TWO GENERAL ASSISTANT ENGINEERS (1 at Plymouth, 1 at Bristol).

Superannuation Scheme. N.J.B. 8AX/CX, £501 to £675.

(b) TWO JUNIOR ENGINEERS (1 at Plymouth, 1 at Bristol).

Superannuation Scheme. N.J.B., 9AX/CX £390 to £556.

Duties will include commissioning and maintenance of protective and control equipment at generating and transmission stations.

Applicants should possess qualifications leading to A.M.I.E.E. and have an interest in protective gear design, generator and switchgear testing and fault current calculations.

In addition for (a) Candidates should have served with one of the leading electrical manufacturers. Experience in high voltage insulation testing would be an advantage.

For (b) Candidates should have either served with one of the leading electrical manufacturers or have completed a B.E.A. Graduate Training Course.

Application forms obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol, 8, to be returned not later than January 12, 1953. (C 223)

GOVERNMENT OF KUWAIT

DIESEL POWER MAINTENANCE ENGINEER required for services with the Government of Kuwait, Persian Gulf. The minimum technical qualification required is the Higher National Certificate in Mechanical Engineering or its equivalent, and age should be from 30 to 35 years. Applicants should have had good experience in Diesel generating stations in an administrative position, and be capable of supervising maintenance and operating the station at the highest possible efficiency. Applicants must have some electrical knowledge, and experience of some steam power plant would be advantageous as at a later date the steam power station is to be commissioned and if suitable a transfer could be arranged. The salary offered is up to £1,650 per annum according to experience. Free furnished quarters and free medical attention are provided. The first year will be probationary, and home leave will be granted at the end of two years' service. Married accommodation cannot be promised during the first year of service. Applications, stating age and giving full details of experience should, in the first instance, be addressed to the Secretary, Ewbank and Partners, Ltd., 10/11 Grosvenor Place, London, S.W.1. (C 248)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

PLANNING ENGINEER, experienced in design, construction and operation of h.t. and l.t. transmission and distribution networks including substations and switchgear, required at Fife Sub-Area Headquarters, Dunfermline. Salary N.J.B. Class "G," Grade 4, £905 to £944 p.a.

Candidates should be corporate members I.E.E., or possess equivalent qualifications. Applications stating age, technical qualifications, experience and present grade with copy references to Manager, Fife Sub-Area, South East Scotland Electricity Board, East Port, Dunfermline, Fife, before January 31, 1953. (C 224)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Schedule 'A' or 'C.'

DEPUTY POWER STATION SUPERINTENDENT
Bankside Power Station.

Qualifications: Sound technical training with wide practical experience in electrical and mechanical engineering and in power station practice. Applicants should have experience in maintenance and operation of h.p. plant and experience in oil firing will be an advantage. Experience in general management with a successful record in labour relations essential. Salary—Class "H," Grade 3—£1,085 p.a.

SHIFT CHARGE ENGINEER
Blackwall Point Power Station.

Qualifications: Higher Nat. Cert. (Elec. or Mech.) or equivalent and preferably member of a recognised Institute. Applicants should have wide experience in operation of modern high pressure turbine and boiler plant, preferably with pulverised fuel firing. Salary—Class "F," Grade 7—£731 17s. p.a.

INSTRUMENT ENGINEER
Barking "C" Power Station.

Qualifications: Experience in servicing and maintenance of automatic boiler control equipment and in testing and calibration of all types of power station instruments. Preference given to candidates with H.N.C. (Elec. or Mech.). Salary—Class "J," Grade 12—£625 16s. p.a.

STATION SHIFT CONTROL ENGINEER
Grove Road Power Station.

Qualifications: Up to H.N.C. standard or equivalent with sound engineering training. Some experience in control and operation of steam generating plant and main switchgear in modern power station. Salary—Class "F," Grade 10—£605 17s. p.a.

STATION SHIFT CONTROL ENGINEER
Blackwall Point Power Station.

Qualifications: H.N.C. or equivalent and preferably member of a recognised Institute. Applicants should have had wide practical experience in control and operation of modern generating plant and e.h.t. switchgear. Salary—Class "F," Grade 10—£605 17s. p.a.

JUNIOR ENGINEER (OPERATION)
Brunswick Wharf Power Station.

Qualifications: H.N.C. (Elec. or Mech.). Applicants must have experience of boiler or turbine operation as the position gives opportunity for supervision of the running of turbines and P.F. boilers. Salary—Class "H," Grade 14—£524 p.a.

GENERAL ASSISTANT ENGINEER (COMMUNICATIONS)
Technical Department Divisional H.Q.

Duties in connection with testing and maintenance of Private Communications System, including equipment using line, teleprinter and radio techniques. Previous experience desirable. Experience in telephone manufacturer's works an added qualification. Preference given to applicants with at least H.N.C. in Engineering, or equivalent Scientific qualifications. Salary within range £526 1s. to £670 19s., Class "AX," Grade 8, rising to ultimate maximum of £749 18s., Class "EX," Grade 8.

Applications must be made on the form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be returned within 14 days of this advertisement. (C 246)

SOUTH EASTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER
Swale District.

SALARY: £561-£578 p.a., under N.J.B. D.9. Superannuable. Applicants should be qualified with sound general and technical education and experienced in the design, construction and maintenance of h.v. and medium pressure overhead and underground distribution systems, and in the operation of d.c. network and in d.c.-a.c. changeover. Duties involve standby.

Applications, giving two referees, must reach F. E. Fairbank District Manager, SEEBoard, 88a, High Street, Sittingbourne, by January 16, 1953.

CARTOGRAPHER (MALE OR FEMALE)
Kingston and District.

Salary: Male—£235 at age 20 to £375 at 26, rising, subject to satisfactory service, to £450 p.a., plus London Weighting. Female—£188 at age 20 to £300 at 26, rising, subject to satisfactory service, to £360 p.a., plus London Weighting. Superannuable. Applicants should have experience in preparation of mains records and plans, reproduction of ordnance survey maps and general drawing office routine.

Applications on forms obtainable from D. C. Thomson, B.SC., M.I.E.E., Kingston and District Manager, SEEBoard, 22 Claremont Road, Surbiton, Surrey, to be returned, with names of two referees, by January 16, 1953.

A. L. BURNELL,
Secretary.

December, 1952. (C 245)

CITY OF SALISBURY, SOUTHERN RHODESIA

ELECTRICITY DEPARTMENT
VACANCIES FOR E.H.T. CABLE JOINTERS

APPLICATIONS are invited from Plumber Jointers with experience in all types of cables up to and including 33 kV.

Preference will be given to those Jointers with experience on overhead lines. Present rates of pay commencing at 5s. 9d. per hour, rising to 6s. per hour after 12 months satisfactory service to a maximum of 6s. 2½d. per hour, plus 20% cost-of-living allowance. Childrens' allowances up to a maximum of three are payable at a rate of £30 per annum for the first child and £24 per annum for each other child.

Applications should be received on or before February 7, 1953, and addressed to the City Electrical Engineer, P.O. Box 73, Salisbury.

A statement of further details can be obtained from the undersigned.

DAVIS AND SOPER, LTD.,
Agents to the City Council of Salisbury.

52-54 St. Mary Axe,
London E.C.3.
December 22, 1952. (C 249)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

APPLICATIONS are invited for the position of TRAINEE DEMONSTRATOR (FEMALE) in the Edinburgh Sub Area.

Applicants should possess a diploma or certificate in Domestic Science leading to the E.A.W. Certificate. The position will enable the successful applicant to gain experience in public demonstrations and lectures and sales work connected with the Board's Service Centres.

The conditions and salary will be those appropriate to the N.J.C. Agreement, and will be governed by experience, age, qualifications, etc.

Applications, stating age and qualifications, should be forwarded within 14 days to:—

G. T. ALLCOCK,
Edinburgh Sub Area Manager.

South East Scotland Electricity Board,
3 Dewar Place,
Edinburgh 3. (C 222)

NORTH WESTERN ELECTRICITY BOARD

No. 3 Sub-Area

APPOINTMENT OF SUB-AREA MANAGER DESIGNATE

DUE to the impending retirement of Mr. E. Binns, the present Sub-Area Manager, the Board invite applications for the appointment of Sub-Area Manager Designate at Oldham. The successful candidate will be required to take up his duties not later than July 1, 1953, with a view to succeeding as Sub-Area Manager in November, 1953.

The salary will be as decided by the appropriate negotiating body but will be not less than £2,000 per annum initially.

Candidates should have experience in management and in the administration and control of an electricity undertaking. Preference will be given to an applicant who is a qualified electrical engineer.

Applications, on forms to be obtained from the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, should be received by him not later than Saturday, January 17, 1953. (C 231)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for a number of appointments as DISTRICT COMMERCIAL ENGINEER, which are about to be made throughout the Board's area.

The posts are placed on Grade 3 of the National Joint Board Agreement, and the salary will be in accordance with the district classification which varies from C (£790 to £805) to G (£971 to £1,014).

Applicants should be Corporate Members of the Institution of Electrical Engineers or possess an equivalent qualification in electrical engineering, and preferably have experience in the utilisation of electrical energy in industry, commercial, domestic and agricultural premises, a knowledge of installation work, and be conversant with tariffs, sales and all aspects of service to consumers.

The appointments are superannuable and may be subject to medical examination.

Forms of application, which may be obtained from the applicant's Sub-Area Manager or the undersigned, should be completed and returned to the undersigned not later than Saturday, January 24, 1953.

J. MEEK,
Secretary.

62 Dalziel Drive, Glasgow, S.1.
December 24, 1952. (C 254)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the appointment in the buildings department of an ENGINEERING INSPECTOR at a salary in A.P.T. Grade V (£595 to £645).

Applicants must have had good practical experience in the design and installation of equipment in one or more of the following, viz. (a) Electrical installations for buildings; (b) Low pressure hot water heating and domestic hot and cold water systems; (c) Steam services associated with heating and cooking installations.

Preference will be given to members of the Institution of Heating and Ventilation Engineers or the Institution of Electrical Engineers.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within fourteen days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
December 12, 1952. (C 226)

NORTH WESTERN GAS BOARD

Manchester Group

ELECTRICAL SUPERINTENDENT
Partington Works, Manchester.

APPLICATIONS are invited for the above pensionable position at a salary within Grade A.P.T. 12 (£720 to £845 per annum).

Applicants should be preferably Corporate Members of the Institution of Electrical Engineers or have passed Sections A and B or be exempt therefrom. They should have experience in the operation and maintenance of 2,500 kW, 6.6 kV alternators; 6.6 kV and 440 V distribution systems, electric motors and starters up to 500 h.p. at 6.6 kV and the organisation of routine electrical maintenance on large gasworks and coke oven plants.

Detailed applications, giving the names of two referees, should reach the General Manager, North Western Gas Board (Manchester Group) Town Hall, Manchester 2, within 14 days. (C 252)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

STATION SHIFT CONTROL ENGINEER required at Nechells "B" Generating Station, Birmingham. N.J.B. service conditions; superannuable appointment; salary within Schedule "A," Grade "J.10," commencing at £680 per annum.

Higher National Certificate in Electrical Engineering or equivalent qualifications required, together with sound technical training and practical experience in the control and operation of h.p. steam generating plant and main switchgear, preferably in a large generating station.

Application forms available from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned completed by January 16, 1953.

F. W. LAWTON,
Divisional Controller.

December 19, 1952. (C 232)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

APPLICATIONS are invited for the position of DEMONSTRATOR (FEMALE) in the Edinburgh Sub Area.

Applicants should possess a recognised diploma or certificate in Domestic Science, also the E.A.W. Certificate. The successful applicant will be required to conduct lectures and demonstrations, advise consumers and generally assist in Service Centres.

The salary will be Grade 1 of the N.J.C. Agreement, at present £380 to £470 per annum.

Applications, stating age, qualifications and experience, should be forwarded within 14 days to:—

G. T. ALLCOCK,
Edinburgh Sub Area Manager.

South East Scotland Electricity Board,
3 Dewar Place,
Edinburgh 3. (C 221)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

South Caledonia Area

NORTH OF SCOTLAND Hydro-Electric Board, South Caledonia Area. There is a vacancy for a CHARGE-HAND METER TESTER AND REPAIRER in the Board's Test Department at Perth. Applicants must be fully experienced in the repair and testing of all types of meters and time switches, etc. The conditions of employment will be those laid down by the N.J.I.C. for the Electricity Supply Industry, the present rate of pay being 4s.50 pence per hour for a forty-four hour week. A house may possibly be made available to the successful applicant. Application forms can be obtained from A. Grant, Esq., B.Sc., M.I.E.E., Area Manager, Blackfriars, Perth. (C 230)

APPLICATIONS are invited by the General Electric Co. Ltd., for the position of MALE SHOWROOM ASSISTANT at the head office in Kingsway. It is essential for applicants to have had experience in a similar capacity, a knowledge of decorative fittings and not be more than 35 years of age. The position offers good prospects of promotion.—Apply in writing, giving full personal particulars, also of education and experience to the Staff Manager, Magnet House, Kingsway, London, W.C.2. (C 256)

APPLICATIONS are invited from young ENGINEERS who would wish to make their career with a firm of Consulting Engineers. Applicants should have an engineering degree and should be capable of writing reports and handling contract work in connection with thermal generating stations, hydro-electric power stations, high voltage transmission and substations.—Applications should be addressed to Ref. J., Kennedy and Donkin, 12 Caxton Street, S.W.1. (C 258)

BRITISH ELECTRICITY AUTHORITY, Merseyside and North Wales Division, have the following vacancies at the Bromborough Power Station:—

(a) SHIFT CHARGE ENGINEER. Salary £772 to £802. N.J.B. Class "H," Grade 7. Experience in shift operation of generating plant essential.

(b) TECHNICAL ASSISTANT. Salary £523 to £542. N.J.B. Class "H," Grade 13. Knowledge of a modern power station is required.

A good general and technical education are required for both appointments which are superannuable and subject to medical examination. A recognised degree in engineering or equivalent qualification is desirable.

Application forms may be obtained from the Divisional Secretary, Beaconsfield Road, Woolton, Liverpool. Closing date, January 10, 1953. (C 236)

BRITISH ELECTRICITY AUTHORITY, Merseyside and North Wales Division, require GENERAL ASSISTANT ENGINEER (Planning and Development) for Technical Department, Divisional Headquarters. Salary £501 to £639 per annum. N.J.B. Class "AX," Grade 8. Superannuable and subject to medical examination. Applicants should possess an engineering degree or equivalent qualifications, and preferably have some knowledge of short circuit and load flow calculations. Experience in circuit diagram work would be an advantage.—Applications, stating age, experience and present employment, to the Divisional Secretary, Beaconsfield Road, Woolton, Liverpool. Closing date, January 10, 1953. (C 237)

BRITISH ELECTRICITY AUTHORITY require INFORMATION OFFICER in the Public Relations Branch at Headquarters in London. Desirable qualifications include economics degree or comparable qualification; ability to write clear, simple English; experience of administration and of information work, including collection, classification and indexing of material, and preparation of information papers and abstracts. Salary within N.J.C. Grade 4, £610-£672. Pension scheme.

Applications, giving age, experience, present post and salary and two referees to D. Moffat, Director of Establishments, Winsley Street, London W.1. Quote Ref. AE/303/ET. Closing date January 15, 1953. (C 250)

DOMESTIC COOKER DEMONSTRATOR required by British National Electrics, Ltd., for Northern England and Scottish areas. Applicants should preferably hold a Domestic Science Certificate and the E.A.W. Housecraft Certificate. Experience in the electrical industry is an advantage and applicants must be prepared to travel. Salary will be in accordance with training and experience.—Apply in writing, giving full details, to Employment and Welfare Manager, Johnson and Phillips, Ltd., Charlton, London, S.E.7. (C 259)

DRAUGHTSMAN, aged 23 to 30, preferably with experience on transformers up to 11 kV and 2,000 kVA.—Write, stating age, experience and salary required, to Lindley Thompson Transformer Co., St. Mary's Road, Slough. (C 64)

JOHNSON & PHILLIPS, LTD., have vacancies for SALES ENGINEERS in London, Glasgow and South Wales, and would like to receive applications from experienced and qualified men who are used to dealing with the sales of any or all of the following products: Cables of all types, Switchgear, Transformers, Power Factor Correction Capacitors. For these vacancies preference will be given to men who have had a few years' outside sales experience and are in the 30/35 age group. Applications, with full particulars as to experience, technical background and salary classification, should be sent to the Employment and Welfare Manager, Johnson & Phillips, Ltd., Victoria Way, Charlton, London S.E.7. (C 199)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

IMPORTANT electrical installation contractors with branches throughout the country, have vacancy for capable and energetic contracts planning and supervising ENGINEER, having sound comprehensive contracting experience. Also vacancies for ambitious young CONTRACTING ENGINEERS for general supervision. Our own staff have been notified of this advertisement.—Apply, giving full details of experience to Box No. 2387, Electrical Times. (C 257)

MAINTENANCE ELECTRICIAN required for engineering works. Candidates to have had experience on the following equipment: a.c. and d.c. machinery, electrical equipment on modern machine tools, and a knowledge of industrial electronics.—Apply Box No. AC7916, Samson Clarks, 57/61 Mortimer Street, London W.1. (C 233)

PILKINGTON BROTHERS LIMITED, Glass Manufacturers, require ASSISTANT ELECTRICAL ENGINEER (not over 27 years of age) for large Electrical Plants in the North of England.

The field covers the design, construction and maintenance of heavy electrical installations, and also electrical development, instrumentation and automatic control (including electronic) of new and existing processes.

Applicants should possess a University Degree in Electrical Engineering, should be Graduates of the Institution of Electrical Engineers, and should have at least two years' practical experience. Salary according to age and qualifications.

Applications should be addressed to the Chief Personnel Officer, Pilkington Brothers, Ltd., St. Helens, Lancashire. (C 198)

RESEARCH. A. Reyrolle and Co., Ltd., have vacancies for ELECTRICAL ENGINEERS and PHYSICISTS to be engaged on the various aspects of research in connection with the development and performance of h.v. and e.h.v. switchgear, including circuit breaking, insulation, system conditions protection and instrumentation. Applicants should be graduates of a British University, preferably with an honours degree, and while previous experience on similar type of work would be an advantage, graduates with the required technical knowledge only may be selected for training. Salaries according to age and experience. Excellent working conditions with modern, fully equipped laboratories; superannuation scheme.—Applications, which will be treated in the strictest confidence, to be submitted with full particulars to the Chief Engineer, A. Reyrolle and Co., Ltd., Hebburn, Co. Durham. (C 234)

REVO ELECTRIC CO. LTD., invite applications for the position of SALES MANAGER for the Domestic Appliance Department, including Cookers. First-class administrative ability with actual sales experience essential, both in the home and export markets.

Must have initiative, and be capable of promoting sales campaigns. Knowledge of design and development also an advantage. The position offers scope and is superannuated.—Apply in confidence stating age, salary required, and all other details, writing only to Sales Director, Tipton, Staffs. (C 210)

TRANSFORMER WINDERS required, capable of winding large transformers, 5,000 to 50,000 kVA. Excellent working conditions and highest rates of pay.—Apply: Labour Manager, General Electric Co., Ltd., Witton, Birmingham 6. (C 251)

WIREMAN ELECTRICIAN required for housing contract in New Zealand. Possession of City and Guilds Certificate or equivalent a necessary qualification. Contract is for approximately a 12 month duration. Commence January, 1953.—Send full details of experience and qualifications, Box No. 2285, Electrical Times. (C 255)

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AMBITIOUS man of 35 desires a change of employment. Nineteen years' experience in the industry with Electricity Supply Undertakings and a leading Electrical Wholesaler. Proved organisational ability. Experienced in stock control, buying and accustomed to positions of responsibility. Qualified A.M.I.I.A. and A.M.P.O.O.—Box No. 2275, Electrical Times. (C 203)

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ZEROS REFRIGERATORS. Complete range of REPAIR AND SERVICE now available. Equipment reconditioned to pre-war manufacturers' specifications.—Time Engineers, Ltd., Refrigeration Specialists, Victory Road, Rainham, Essex (Rainham 4625), or Southern Area Agency (Tel.: Springpark 4217). Electrical spares supplied to the trade. (C 178)

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A.C.-D.C. MOTORS, STARTERS, complete, change-over installations, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (C 10)

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And sale morning to 11 a.m.

SPECIAL NOTE.—A further sale will be held on Wednesday, February 25, goods on No. 7 Site, Blackwood, Longtown, 9 miles north of Carlisle. A similar display is anticipated. Please note this, the only advertisement
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Catalogue 6d. each, admits two to viewing, one to sale. Clients requiring catalogue for each sale should send 1s. and state their needs.

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STANDARD electric iron ELEMENTS, 11s. 6d. dozen, state voltage.—Swan, 7-9 Bradshaw Street, Shudehill, Manchester. (C 262)

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BRITISH ELECTRICITY AUTHORITY

South Wales Division

TENDERS are invited for the disposal of DIESEL GENERATING PLANT and ancillary equipment at St. Clears Power Station, Carmarthenshire.

Details and tender forms may be obtained from the Divisional Secretary, British Electricity Authority, South Wales Division, Cardiff (Pengam Moors) Airport, Cardiff, to whom tenders must be returned by 10 a.m. on January 17, 1953.

Inspection by arrangement with District Engineer, South Wales Electricity Board, 126 Lammas Street, Carmarthen (Carmarthen 462). (C 243)

GENERATING SET, Meadows petrol electric, 9 kVA, 230 v, a.c., automatic, as new. £175.—H. S. Cawsey, Station Approach, West Byfleet, Surrey. (C 244)

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313-kVA steam ALTERNATOR SET by Browett Lindley/Westinghouse, for 400/440/3/50, 4 wire, 452/410 amps., 428 r.p.m. Steam pressure 160-200 lb. exhausting to vacuum or atmosphere. Total temp. up to 537° F. Makers advise that with steam at 180-200 lb. could be operated with 5-10 lb. back pressure.

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250-kVA steam-driven ALTERNATOR SET by Belliss and Morcom/Harland, for 400/3/50, 360 amps., 0.8 p.f. Steam pressure 140 lb., 12 lb. back pressure.

George Cohen, Sons and Co. Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (C 263)

116-kW "Blackstone" Metropolitan-Vickers DIESEL ALTERNATOR SET, comprising 168 h.p. 500 r.p.m. engine and direct coupled alternator with exciter. Output 400 V, 50 c/s, 3 phase. 4 wires, with switch board instruments, circuit breaker, AVR, etc. And all engine auxiliaries.—Hubert Jones Ltd., Cobden Street, Pendleton, Salford 6. Tel.: Pen. 1373-4. (C 264)

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HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 12)

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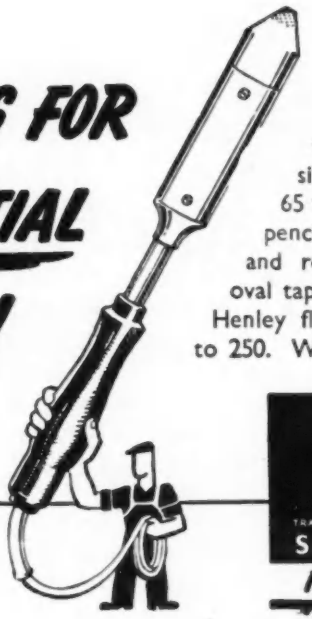

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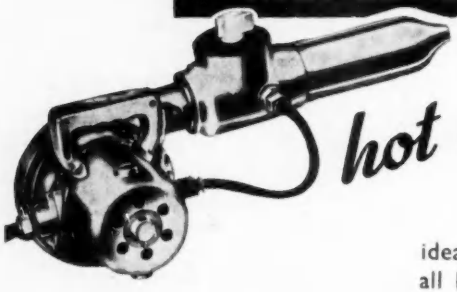

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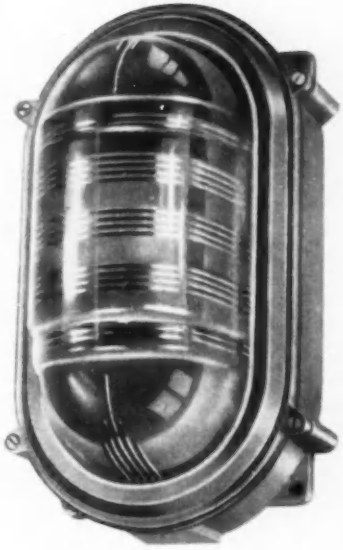

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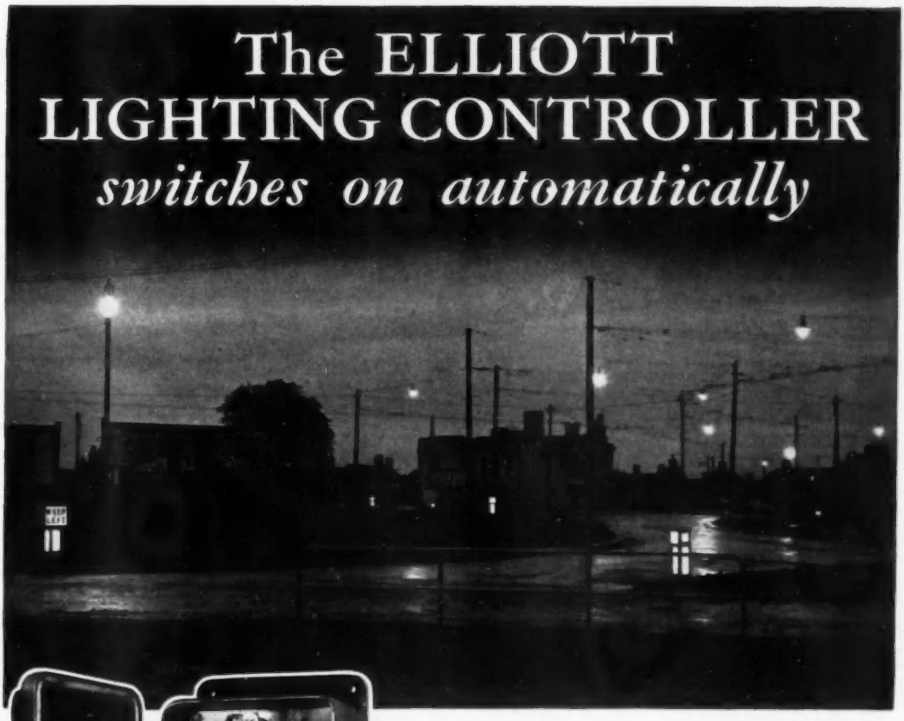

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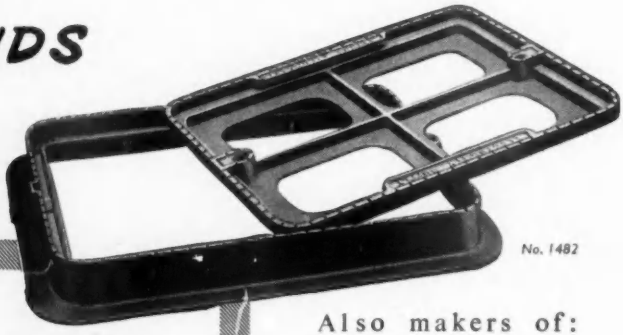

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TYPES H, HST, HST/AM

(illustrated)
TYPE HST/AM

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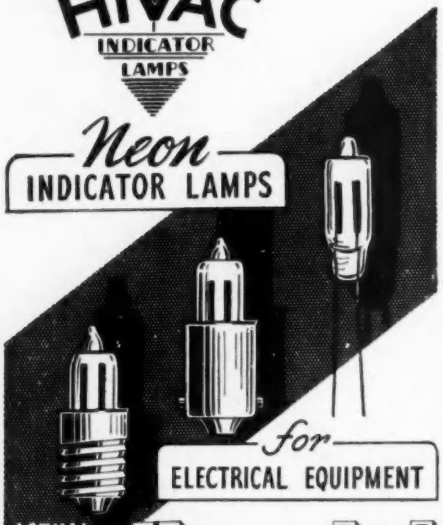

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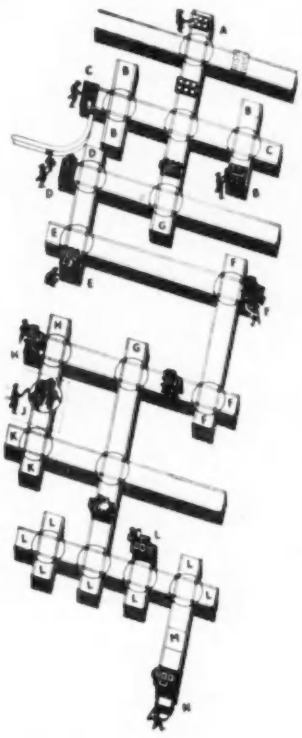

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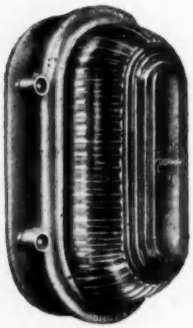

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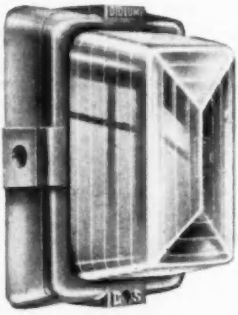

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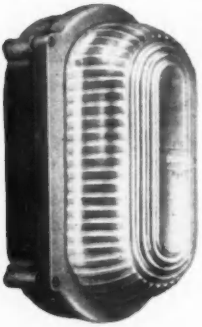

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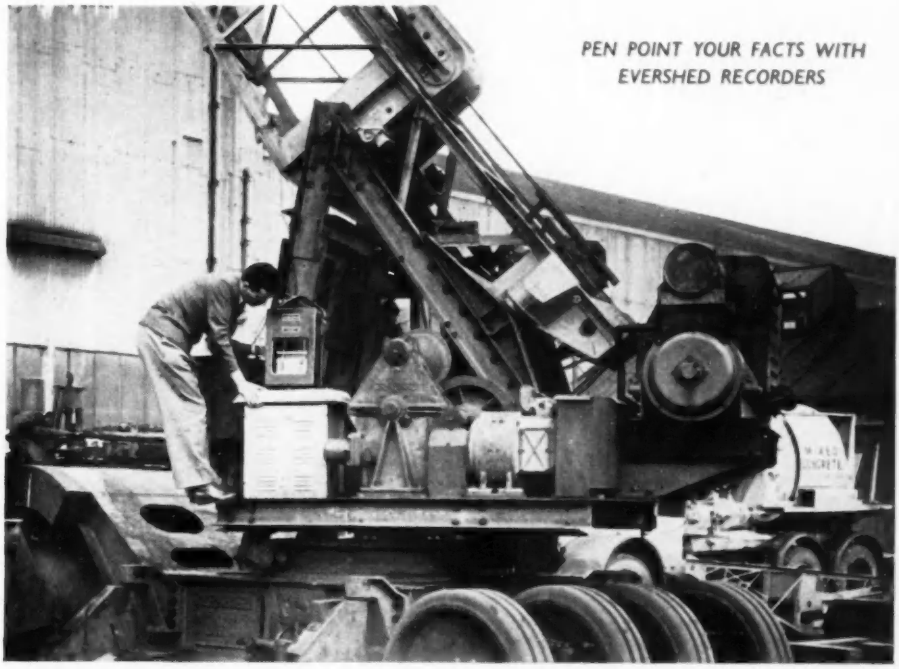

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The Ransomes and Rapier mobile crane illustrated here was fitted with a special jib for handling cargo. To ensure the suitability of the motor for the special duty involved, an Evershed Chart Recorder was used during trials to record the current taken by various motors under varying conditions. This is only one instance of the many uses to which this famous British engineering firm have put Evershed Recorders in its investigation of motor loading under actual working conditions, which also helps to discover if the operator is following the correct sequence of loading or excavation.

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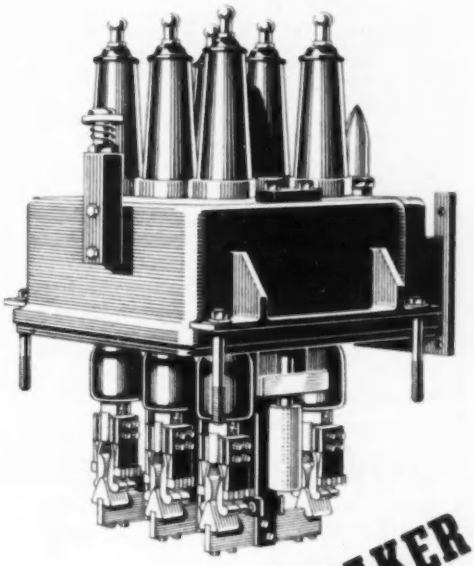

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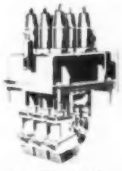
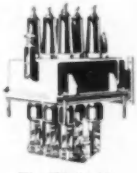


The TRINAL Arc-control Breaker

The TRINAL Plain-break Breaker



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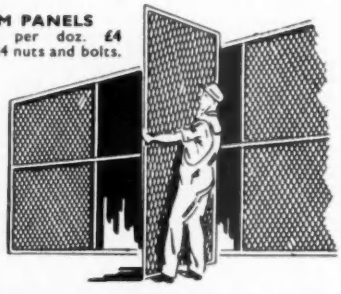

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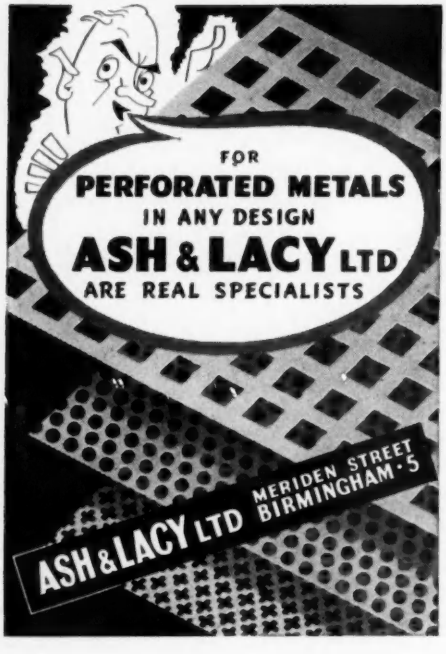

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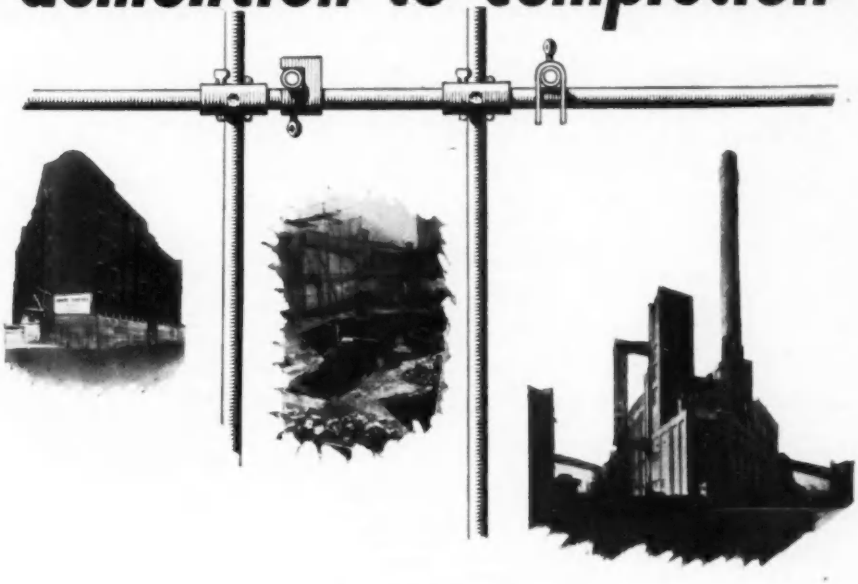

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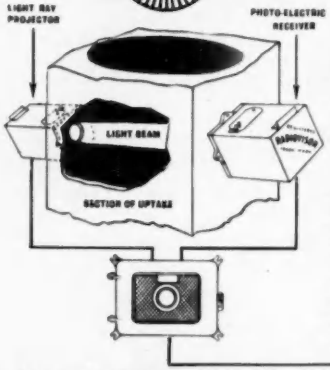
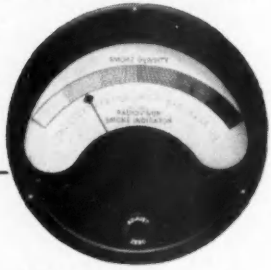


The Radiovisor Industrial Smoke Density Indicator is in extensive use in Power Stations and Industrial Power Houses to give a continuous record of the smoke passing through a flue or up-take. A ray of light is projected across the flue on to a Photo-Electric Cell. The intensity of light received by the latter, and consequently the photo-electric current, is governed by the smoke density. After amplification, the photo-electric current is indicated on an instrument having a Ringlemann Smoke Scale. Indicator Alarms and Recorders can also be fitted. The units are designed for bolting direct to a stack or up-take, and plate glass windows protect the optical components from direct contact with the flue gases. Air jets are fitted to keep the windows free from soot deposits.



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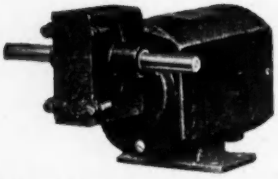

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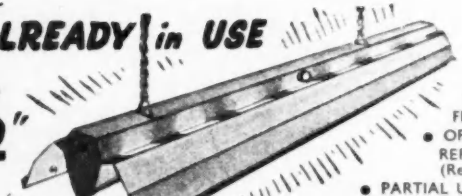

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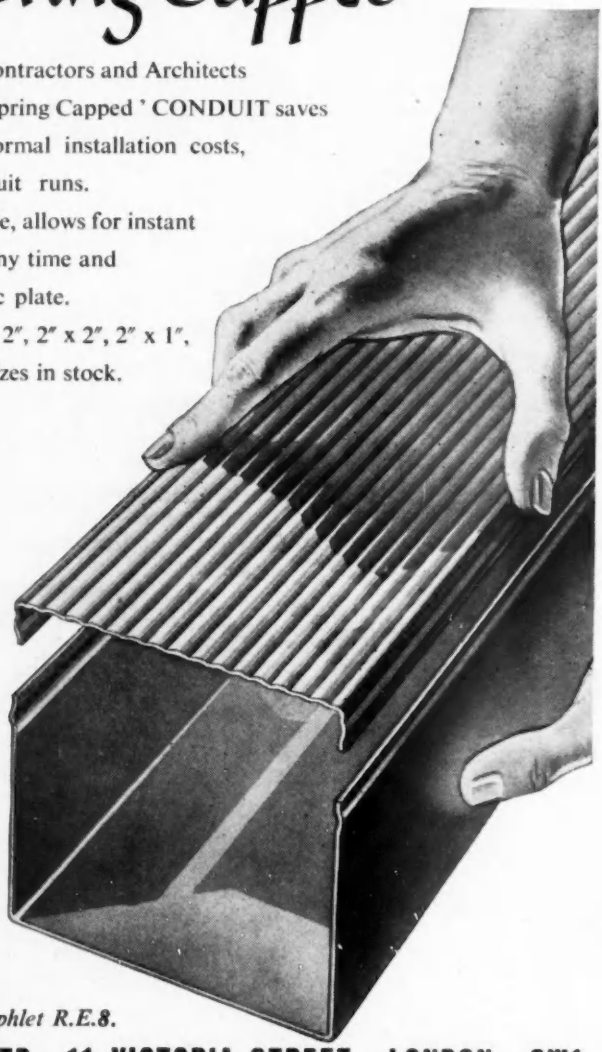

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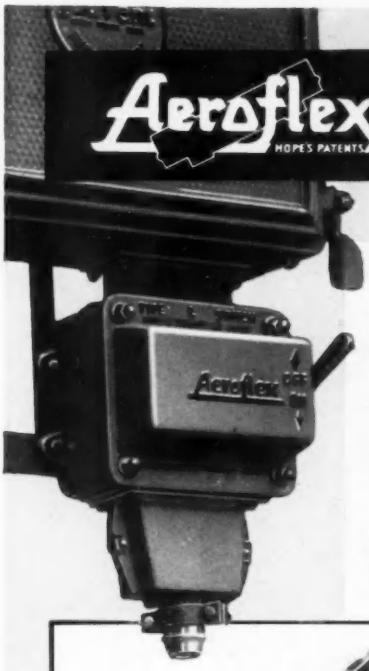

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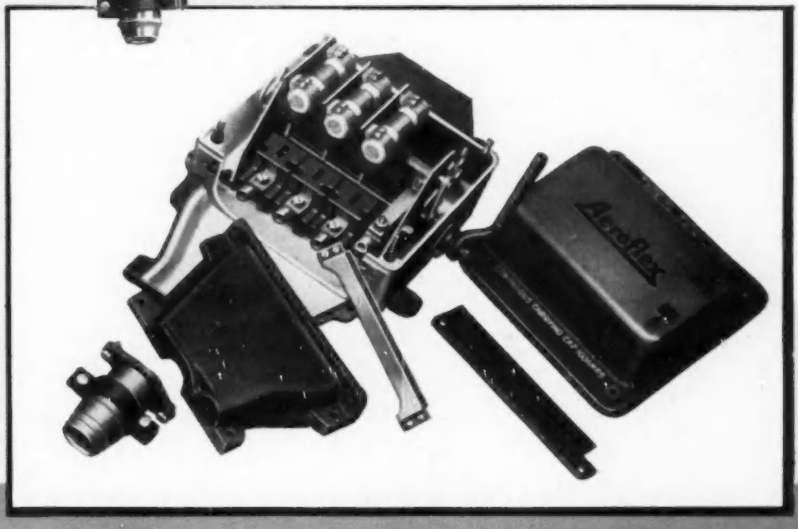

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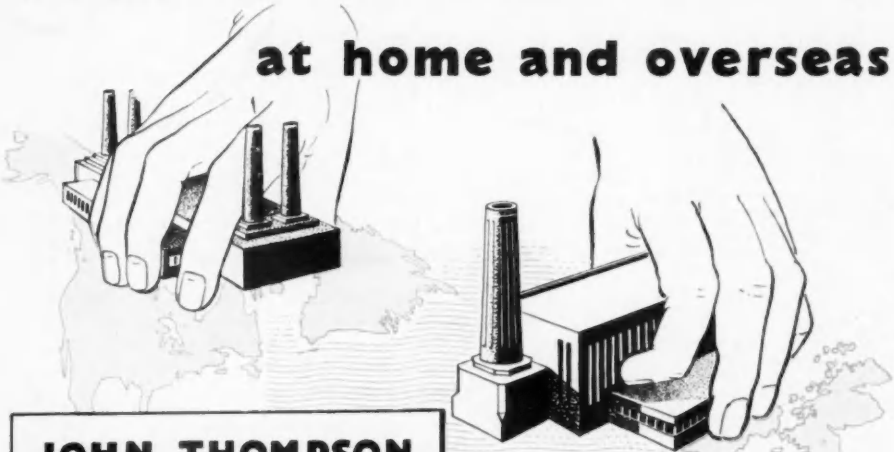

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